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The 2019 Eastern and Northern Bering Sea Continental Shelf Trawl Surveys: Results for Commercial Crab Species

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
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The 2019 Eastern and Northern Bering Sea Continental Shelf Trawl Surveys: Results for Commercial Crab Species

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ABSTRACT

The eastern Bering Sea bottom trawl survey has been annually conducted since 1975 by the Resource Assessment and Conservation Engineering Division of the Alaska Fisheries Science Center, National Marine Fisheries Service. The purpose of this survey is to collect data on the distribution and abundance of crab, groundfish, and other benthic resources in the eastern Bering Sea. These data are used to estimate population abundance and biomass for the management of commercially important species. This document includes the time series of results from 1975 to the present. In 2019, 375 total stations were sampled on the eastern Bering Sea shelf from 3 June to 28 July.

In 2019 the overall estimated biomass and abundance of Bristol Bay red king crab (*Paralithodes camtschaticus*) remained approximately the same, although there was a decline in legal male crab. Mature and legal red king crab males in the Pribilof Islands increased, while females and immature males declined or remained steady. Both red king crab populations saw an increase in pre-recruit abundance. There was an overall increase in estimated blue king crab biomass and abundance, except for Pribilof Islands immature females, of which none were caught in the survey. Estimated biomass and abundance of Tanner crab (*Chionoecetes bairdi*) declined for legal and mature males. Females and immature males remained approximately the same, except for the biomass of immature males east of 166° W, which increased. There was an overall increase in legal, mature, and pre-recruit male snow crab (*Chionoecetes opilio*), while immature males and all females declined.

In addition to the standard eastern Bering Sea survey, in 2019, following the conclusion of the standard survey, 144 stations were sampled in the northern Bering Sea region, encompassing the region south of Bering Strait, and including Norton Sound. These stations were sampled between 28 July and 20 August. We report the results of this survey separately from the eastern Bering Sea survey, within the northern Bering Sea section of this report. Blue king crab occurred largely in the region north of St. Lawrence Island. Estimated biomass and abundance declined in 2019 and densities were lower than for the St. Matthew Island stock. Red king crab occurred primarily in Norton Sound, with an overall decline in the biomass and abundance of mature males and an increase in immature crab. Density and abundance estimates for immature red king crab in Norton Sound were higher than observed in the Bristol Bay District, but the reverse pattern was seen for mature red king crab. Snow crab dominated the northern Bering Sea catch, with increases in both biomass and abundance estimates for mature and legal crab, especially along the border between the eastern Bering Sea and northern Bering Sea survey areas. Immature snow crab were distributed throughout most of the northern Bering Sea, but declined in overall biomass and abundance.

The 2019 biomass estimates, reported in metric tons (t) and pounds (lb) with 95% confidence intervals (± 1.96 SE) for legal and preferred-sized males of each commercial crab stock in the eastern Bering Sea were as follows:

Commercial crab stock	2019 legal male biomass* (±95% CI)	
	t*	lb**
Bristol Bay District red king crab (*Paralithodes camtschaticus*)	8,965 (3,109)	19,763,831 (6,853,889)
Pribilof District red king crab	1,101 (895)	2,428,134 (1,973,923)
Pribilof District blue king crab (*P. platypus*)	204 (241)	449,206 (531,876)
St. Matthew Is. Section blue king crab	2,304 (1,483)	5,079,172 (3,269,273)
Tanner crab, east 166° W (*Chionoecetes bairdi*)	5,521 (2,138)	12,171,353 (4,713,570)
Tanner crab, east 166° W ≥ 4.9 inches (preferred size)	4,769 (1,939)	10,514,199 (4,274,252)
Tanner crab, west 166° W	8,749 (2,452)	19,288,821 (5,406,100)
Tanner crab, west 166° W ≥ 4.9 inches (preferred size)	5,001 (1,563)	11,026,171 (3,445,759)
Snow crab, all districts (*Chionoecetes opilio*)	175,907 (59,240)	387,808,377 (130,601,303)
Snow crab, all districts ≥ 4.0 inches (preferred size)	28,955 (10,145)	63,834,534 (22,365,317)

*Estimates for preferred size classes are those with sizes listed in the left column.
**Biomass estimates in pounds were derived by converting the raw length data to pounds using regressions in Table 3 prior to calculating the area-swept estimate.

CONTENTS

INTRODUCTION

Survey History and Purpose

The eastern Bering Sea (EBS) bottom trawl survey has been conducted by scientists in the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC), National Marine Fisheries Service (NMFS), since the early 1970s. Beginning in 1975, surveys were conducted annually, and were expanded beyond Bristol Bay to include the majority of the EBS continental shelf with the original purpose of assessing potential resource impacts of offshore oil development (Pereyra et al. 1978). The annual collection of data on the distribution and abundance of crab and groundfish resources provides fishery-independent population estimates, and biological data critical to the management of commercially important species in the EBS. Commercially important crab species that have historically been assessed during the survey include: red king crab (*Paralithodes camtschaticus*), blue king crab (*P. platypus*), southern Tanner crab (*Chionoecetes bairdi*), snow crab (*C. opilio*), and hair crab (*Erimacrus isenbeckii*). Although the common name for *C. bairdi* changed from Tanner crab to southern Tanner crab in 2005 (McLaughlin et al. 2005), it will still be referred to as Tanner crab in this document.

Prior to 1988, the total number of stations varied, and gradually increased until being standardized in 1988 (Fig. 1). Therefore, the pre-1988 estimates provided in this document for stocks that extend northwest of the Pribilof Islands are not directly comparable to later estimates, as the entire stocks were not sampled. From 1988 to 2014, 376 standard stations were included in the survey covering approximately 140,350 square nautical mile (nmi^2) area of the EBS, with station depths ranging from 20 to 200 m (Fig. 1). Since 2015, station Z-04 (AZ-0504) has been excluded for crab population estimation because the station has a limited area of crab habitat within a trawlable depth range. This document reports the full time series re-calculated without data from this station. The annual EBS bottom trawl survey begins in the northeast section of Bristol Bay in early June, and between 4 and 6 stations are typically sampled each day from each of two vessels (Fig. 2). The standard survey is completed in late July or early August at the western edge of the survey grid, northwest of St. Matthew Island. In some years (i.e., 1999, 2000, 2006-2012, 2017) when the red king crab reproductive cycle is delayed due to colder water temperatures, a small portion of the inner Bristol Bay area is resampled after the conclusion of the standard survey (see Methods).

Eastern Bering Sea Crab Stock Assessment Process

Crab species included in the federal Bering Sea and Aleutian Islands (BSAI) King and Tanner Crab Fisheries Management Plan are managed by the Alaska Department of Fish and Game (ADF&G), with federal oversight by NMFS (NPFMC 2011). The annual stock assessment and fishery evaluation (SAFE) report prepared by the North Pacific Fishery Management Council provides current biological, ecosystem, and economic data associated with these commercial crab species. The NMFS determines the procedure for setting overfishing levels (OFL) and allowable biological catch (ABC), while ADF&G sets the annual total allowable catch (TAC) or guideline harvest level (GHL) for each crab stock. Currently, the Council's Crab Plan Team

(CPT) and the Scientific and Statistical Committee (SSC) review the assessment, biological, economic, and modeling data to recommend biological reference points associated with the status of crab stocks. Crab stock boundaries are defined by ADF&G management units for king crab and Tanner crab species (Fitch et al. 2012). The Pribilof Islands blue king crab stock boundary also includes a 180 nmi × 20 nmi (9 × 1 station) column on the east side of the management unit, which was added in 2013 to account for blue king crab survey and bycatch data (NPFMC 2014). Red king crab are split into Bristol Bay and Pribilof Islands stocks, while blue king crab are split into Pribilof Islands and St. Matthew Island stocks for management purposes. Tanner and snow crab fisheries are considered to be single stocks, but are split into separate management fishery units defined by the ADF&G Board of Fisheries using 166° W and 173° W as the boundary for each east and west unit, respectively.

This section of the report summarizes the 2019 survey results for commercially important crab resources in the eastern Bering Sea. A separate section details survey results for the northern Bering Sea. Note that area-swept estimates in this document are indices of abundance, and thus may not match the final modeled population estimates in the SAFE reports because the models include additional population dynamics information. The results of the 2019 standard EBS bottom trawl survey are presented for these crab stocks as defined by the previously described management units. Details of the survey design and fishing gear specifications, in addition to the number and weights of the groundfish species sampled at each standard station during this survey, will be reported in a separate NOAA Technical Memorandum (e.g., Lauth et al. 2019).

METHODS

Survey Area and Sampling Logistics

The 2019 standard survey was conducted onboard the chartered fishing vessels FV *Alaska Knight* and FV *Vesteraalen*, beginning 3 June in the northeast corner of Bristol Bay, moving westward, and finishing on 28 July. The vessels sampled in close proximity to each other for much of the survey (Fig. 2).

The survey stations are divided into multiple management units defined by ADF&G commercial registration areas and districts, and are further divided into strata with either standard or high station densities (Fig. 3). Standard-density strata have stations centered in 20 × 20 nmi (37.04 × 37.04 km) cells, while high-density strata include additional stations at the corners of the 20 × 20 nmi cells. To calculate the total area for each stock strata, the area for each 20 × 20 nmi cell is assumed to be 401 nmi^2 due to the effects of a spherical projection of the flat grid surface in an area as large as the EBS.

The king crab Registration Area T in Bristol Bay (south of 58 °39 ′N and east of 168 °W) is 54,536 nmi^2 and consists of 136 stations. The king crab Registration Area Q in the Bering Sea is divided into the Northern District (north of 58° 39′ N) and the Pribilof District (south of 58° 39′ N and west of 168° W). The area for the St. Matthew Island Section of the Northern District is divided into two sampling strata: 1) a high-density 7,218 nmi^2 stratum with 28 stations (one of

which is not trawlable, but is included in the total area surveyed), and 2) a standard-density 11,629 nmi^2 stratum with 29 stations, for a total of 56 stations within the St. Matthew Island Section. The area of the Pribilof District is divided into two sampling strata: 1) a high-density 10,025 nmi^2 stratum with 41 total stations, and 2) a standard-density 14,436 nmi^2 stratum with 36 stations, for a total of 77 stations within the stock area. For Pribilof District blue king crab, the eastern stock boundary is 20 miles east of the Pribilof District and includes nine additional stations, as indicated in the 2013 Pribilof Islands Blue King Crab Rebuilding Plan (NPFMC 2014). High-density strata are classified on the basis of having more stations (both the standard center and up to four corner stations) per area than standard-density strata (Fig. 3).

The fishing gear used in 2019 was identical to that of previous EBS annual bottom trawl surveys conducted since 1982, with both vessels fishing a standard 83-112 Eastern otter trawl employing an 83 ft (25.3 m) head rope, and a 112 ft (34.1 m) footrope (Lauth and Nichol 2013). The cod-end mesh size is 8.9 cm stretched and the liner is 3.2 cm. The trawl nets on each vessel were removed from service and replaced with new nets every 20-30 consecutive tows (~5 days) to mitigate potential impacts from changes in net configuration due to fishing. Each tow was approximately 0.5 h in duration and 1.5 nmi (2.8 km) in length, and was conducted at a speed of 3 knots (1.54 m sec^{-1}) (see Results for details), in strict compliance with NMFS bottom trawl protocols established by the National Oceanic and Atmospheric Administration (Stauffer 2004).

Net mensuration equipment (Marport sensors) was used to monitor the net's fishing performance during each tow. A bottom contact sensor was attached to the center of the footrope to measure bottom contact of the net at 1-second intervals. The net mensuration system also included an acoustic sensor attached to the headrope, and two sensors attached to the port and starboard dandylines to measure net height and width during trawling operations. Data on bottom contact of the footrope, and GPS data were combined to calculate distance fished. Fishing power was assumed to be equal between the two vessels.

Surface and bottom water temperatures along with temperature-depth profiles were collected at 6-second intervals throughout the duration of each tow using a Sea-Bird SBE-39 bathythermograph continuous data recorder (Sea-Bird Electronics Inc., Bellevue, WA) attached to the headrope of the net. The temperature measurement range of the SBE-39 is -5 to 35 ± 0.002 °C with pressure sensors measuring to a maximum depth of 1,000 ± 1 m and are calibrated every year by Sea-Bird Electronics. Bottom depth was also derived from these data by adding the net height from the net mensuration system to the headrope depth estimated by the SBE-39.

Biological Data Collection

For each tow, all crab were removed from the catch, sorted by species and sex, and a total catch weight was obtained for each species. Tanner and snow crab hybrids are identified by a combination of characteristics including curve of the epistome margin, eye color, carapace shape, and space between or shape of the rostrum horns (Karinen and Hoopes 1971, Urban et al. 2002). A random subsample of the total catch typically occurred in cases where an exceptionally large number (approximately > 300) of a given species was caught in a tow. When conducted, subsamples varied in size and composition depending on the particular tow. The subsample may

have occurred at the level of the entire catch or at the level of a particular size and sex category once the catch was sorted. The total weights of the sampled crab and non-sampled crab were recorded and an expansion factor was calculated to determine the final number of each species in a particular tow.

Individual crab carapaces were measured (± 0.1 mm) to provide a size-frequency distribution of each sample. Crab sizes are reported as carapace width (CW) excluding spines for Tanner and snow crab, and carapace length (CL) for hair crab and all king crab (Donaldson and Byersdorfer 2005). Since 2006, individual weights were measured for blue king crab every year, red king crab and snow crab in odd years, and for Tanner crab in even years to add to the existing length-weight data and to monitor temporal variability in length-weight regressions. For every haul in 2019, length-weight data were collected on up to five snow crab and five red king crab per each of the following categories: 1) male crab, 2) ovigerous crab, and 3) non-ovigerous female crab. Because of their relative rarity, weight data were collected for all intact blue king crab encountered that met the sampling requirements (i.e., whole, live crab without regenerating limbs). Weights were collected from representative size ranges throughout the spatial distribution of each species.

In the absence of specific age data, shell condition serves as a semi-quantitative index of molt status and time in shell post-molt. For all EBS crab stocks, and particularly those which exhibit a terminal molt at maturity (i.e., *Chionoecetes* spp.), shell condition is a requisite for setting harvest quotas. Carapace shell condition was assessed for each crab sampled and assigned to one of six classes according to specific criteria (0 = premolt or molting, 1 = soft and pliable, 2 = new hardshell both firm and clean, 3 = oldshell slightly worn, 4 = oldshell worn, 5 = very oldshell).

Clutch assessment is used to estimate spawning stock biomass and overall reproductive health and to monitor demographic changes in the mating population. All female crab abdomens were evaluated to determine reproductive condition based on the color of the eggs (0 = no eggs, 2 = purple, 3 = brown, 4 = orange, 5 = purple-brown, 6 = pink), the condition of the eggs (0 = no eggs, 1 = uneyed, 2 = eyed, 3 = dead, 4 = empty egg cases), and the size of the egg clutch (0 = immature, 1 = mature female no eggs, 2 = trace to 1/8, 3 = 1/4, 4 = 1/2, 5 = 3/4, 6 = full). Beginning with the 2017 survey, an additional egg condition code, 5 = hatching, was employed to denote females that were sampled while in the process of hatching their clutch.

For mature females, a combination of individual egg clutch and egg condition codes was used to identify a given female's stage in the molt-mate cycle. Completion of the molt-mate cycle was indicated by mature females brooding uneyed embryos. Conversely, the presence of eyed embryos, hatching eggs, empty egg cases, or absence of eggs (barren, hereafter) in morphologically mature females indicated an incomplete cycle. The annual ratio of females with uneyed embryos to those with eyed embryos, hatching eggs, empty egg cases, or that were barren and possessed an old shell was derived as a metric for the progression of the molt-mate cycle within the population as a whole during the survey.

Understanding reproductive biology is critical for managing crab stocks in the Bering Sea. Spatiotemporal variability in reproductive potential including fecundity, sperm reserves, and reproductive condition likely influences fluctuations in population abundances. Yet, most stock

assessment models use mature male biomass, but not embryo production, which can lead to different perceptions of estimated recruitment (Trippel 1999, Swiney et al. 2012). In recent years, egg clutches for red king crab in Bristol Bay and *Chionoecetes* spp. throughout the eastern Bering Sea were collected during the survey to support process studies to assess female reproductive potential. Red king crab and snow crab fecundity varies both interannually and spatially, likely due to demographic variability in crab age as measured by size and shell condition (Rugolo et al. 2005, Swiney et al. 2012). Starting in 2012, mature female red king crab samples were collected (even years only) throughout their distribution to monitor fecundity changes over time. Future analyses will consider the correlations of reproductive potential with demographic and environmental patterns.

Maturity in male *Chionoecetes* spp. can be defined by morphometric characteristics of the chela where morphometrically immature and mature crab are separated into two groups based on the frequency distribution of the chela height (large claw or small claw) to carapace width ratio (Stevens et al. 1993, Tamone et al. 2007). To assess the difference between morphometric maturity and true functional maturity, additional special projects have been conducted in recent years. Chela height measurements for *Chionoecetes* spp. began in 1989. In 2008 a standard sampling protocol for chela height and carapace width measurements was developed (measurements to ± 0.1 mm), with measurements taken for male Tanner crab and snow crab during even and odd years, respectively. Beginning in 2018, chela height and carapace width measurements were collected annually from a subsample (typically ≤ 15 crab per haul) of male Tanner and snow crab caught at each station.

Eastern Bering Sea crab are vulnerable to infection by a variety of pathogens, which may in turn serve as indicators of stock and ecosystem health. Bitter crab syndrome is caused by a parasitic dinoflagellate, *Hematodinium* sp., and is found in Tanner and snow crab throughout Alaska waters (Meyers et al. 1996). The mortality rate of parasitized crab is believed to be high, and symptoms include lethargy, pink carapace pigmentation, and white opaque hemolymph (Meyers and Burton 2009). Meats of parasitized crab are harmless to humans, but are bitter tasting, making the crab unmarketable. The prevalence of bitter crab syndrome fluctuates both temporally and spatially in *Chionoecetes* spp. in the eastern Bering Sea (Meyers et al. 1996), and may be influenced by changes in environmental conditions (Morado et al. 2010). All measured crab were scanned for visual evidence of bitter crab syndrome. For detection of *Hematodinium* sp., Tanner and snow crab blood samples were collected and preserved in ethanol in one index site per species targeting mature crab and each of three index sites targeting immature crab. Preserved samples were sent to Seattle for processing and analysis by the Pathobiology group, Shellfish Assessment Program, at the AFSC in Seattle, Washington. In addition, all measured crab were scanned for evidence of six other known diseases and parasites to capture any increases over present low levels.

Crab Biomass Estimates

Crab densities (number nmi^{-2}) were estimated at each station for sublegal and legal males, as well as mature and immature males and females of each stock. Maturity and legal size classes were based on literature values and State of Alaska regulations (Table 1). The ADF&G definitions for legal size classes (CW in inches) include spines (ADF&G 2017), while CW measurements reported in this document exclude spines (Table 1). The area-swept by the trawl

(nmi^2) was calculated as the product of the distance traveled while the net had bottom contact multiplied by the mean net width over the duration of the tow. Prior to 2009, data reported in this annual document were calculated using a fixed width of 15.2 m (0.008 nmi) in the area-swept calculation to maintain consistency with historical crab population estimates. Since 2009, all population abundance and biomass estimates for the entire time series have been calculated using the variable net width based on net mensuration data obtained during the tow (Table 2). The effective width of the trawl typically ranges from 14.6 to 18.3 m when towing at a speed of 3 knots (Weinberg 2003; Fig. 4), and changes with the depth of the tow due to changes in scope of the trawl wire (Rose and Walters 1990). For 2019 and all historical data reported in this current document, crab densities were calculated using the mean net width recorded for the duration of each tow, and a mean net width-inverse scope regression relationship was calculated when net width values were not recorded during a tow (Rose and Walters 1990). From 1975 to 1981, the net width estimates used for the area-swept calculations were derived from a single width estimate calculated each year for a particular type of trawl used during the annual survey. From 1982 to 1987, the net width used in the area-swept calculations was estimated using the inverse relationship between net scope and net width developed by Rose and Walters (1990). From 1988 to 2019, the net width was estimated using the net mensuration system described above, which measures the height and width of the net throughout the duration of the tow (Table 2, Fig. 4). Distance traveled by the trawl was determined from ship GPS positions recorded at the beginning and end of each tow.

All reported historical data and the current biomass estimates are calculated for the number of individual male and female crab at each 1 mm size category for each species, using the weight-size relationships developed by the AFSC's Kodiak Laboratory (Table 3). The size-weight relationships are described by the expression:

$$W = a\, L^{b} \quad ,$$

where W is the total weight in grams, L is either CL or CW in millimeters, a is the intercept in log scale and b is the slope. Parameters a and b for the size-weight relationships are estimated from a linear regression fitted to log-transformed size-weight data collected between 2000 and 2009.

The weights calculated for each 1 mm size bin are summed within the legal male, sublegal male, mature, and immature size categories for each species and sex caught at a station. The crab biomass within a district or section stratum was estimated by averaging crab densities from all stations within the defined district or section stratum, and multiplying by the total area of the district or section stratum specific to that stock. Total biomass was calculated using a stratified design based on management units (standard density, high-density, ADF&G-defined districts, or section stratum). Population biomass estimates were calculated in each stratum and then summed among strata. Variance of the total biomass estimate for each size class was calculated by summing the variance of each stratum. The 95% confidence intervals were calculated using the standard error of the total population multiplied by 1.96. All biomass estimates and confidence intervals (± 95%) reported in this document are reported in metric tons (t) except in the Abstract where both t and pounds (lb) are reported. Metric tons can be converted to pounds by

multiplying the biomass in t by 2,204.62 for comparison with ADF&G reported values of total allowable catch (TAC) and guideline harvest levels (GHL).

In years with colder than average bottom water temperatures (1999, 2000, 2006-2012, and 2017), a small number of standard Bristol Bay stations sampled at the beginning of the survey were resampled in mid-August to accurately assess the percentage of ovigerous red king crab females which had extruded a new clutch of uneyed embryos. Similar to 2018, the average bottom temperatures measured at Bristol Bay stations in June 2019 were warm relative to the long-term average. Over 99% of all ovigerous females had uneyed embryos indicating the completion of the annual reproductive cycle. As such, Bristol Bay stations were not resampled in 2019.

The population biomass estimates reported in this document are point estimates and have substantial uncertainty due to both the expanse of the area being sampled, and the distribution patterns of the sampled stocks. These point estimates are least precise for small crab due to gear selectivity, and for females of some stocks due to crab behavior. For example, female blue king crab prefer rocky habitat, which is difficult to sample with bottom trawls. For consistent analyses, catchability is assumed to be near or equal to one for the indices developed in this document; however, catchability is likely much lower, especially for the smaller size classes (Somerton et al. 2013). The stock assessment models that incorporate these survey data consider catchability when estimating abundance and biomass.

Centers of Distribution

The centers of distribution for male and female crab from 1975 to 2019 were determined by averaging the latitude and longitude of each positive tow for a particular species. Latitude and longitude were weighted by the CPUE for each size and sex class. In cold years when Bristol Bay stations were resampled (discussed in more detail below), only tows from Leg 1 were included.

Recruitment

Population fluctuations are likely influenced by variations in recruitment strength. Thus, assessing temporal variability in abundances of new individuals reaching the minimum legal size is important to predict the following season's catches. The term "recruitment" can refer to various life history stages including newly settled juveniles, individuals reaching sexual maturity, or individuals reaching the legal size limit. For the purposes of this technical memorandum, "pre-recruits" are defined as mature male crab in the size class that will likely enter the fishery (minimum legal size limit) the following year (Table 1). A time series of pre-recruit abundance estimates are provided as an index for future abundances of legal crab.

Distribution-based determination of male *Chionoecetes* spp. maturity status: Methods

Prior to 2018, we presented chela data from the most recent surveys in this document, with an interim maturity classification based on the ratio of the chela to carapace width, with the

accepted ratios being 0.18 for Tanner (*Chionoecetes bairdi*) crab and 0.20 for snow crab (*C. opilio*) (Stevens et al. 1993, Tamone et al. 2005, Tamone et al. 2007). However while this procedure is conceptually straightforward and easily applicable, it misclassifies both small morphometrically mature, and large morphometrically immature crab, to interannually variable degrees (Figs. 81a and 81b). Consequently, a new procedure was developed by Kodiak laboratory staff and first presented in 2018.

For this procedure, chela height and carapace width measurements are linearized via natural-log transformation. Log-transformed paired carapace width-chela height measurements are then binned by increments of the carapace width, by increments of 0.025 in log-space (see Fig. 83a for example of bins used). For each increment, the underlying bimodal distribution of the data is then computed via application of kernel density estimation procedures resident to the R package *stats*, and the minima between distribution density peak calculated (see Fig. 83b for example distribution, with estimated minima). Minima *x* and *y* coordinates for each increment are extracted, and the underlying linear relationship modeled via the R function *lm(),* resident to the package stats (see Fig. 83c for example minima coordinate series, and calculated regression line).

The calculated regression line may then be applied as a cutline to classify morphometrically immature and mature males (Fig. 83d), with the caveat that a minimum accepted mature size should be specified for Tanner crab, due to residual curvature in the chela height-carapace width relationship that can lead to small numbers of very small crab being misclassified. For our purposes, we specified that all crab with carapace widths < 60 mm were immature. This size cutoff was set based on the average size of female crab with the expectation that to mate successfully, males should be larger than females (Stevens et al. 1993). With or without application of this cutoff, however, our procedure shows minimal misclassification rates within the region of overlap between morphometrically mature and immature groups relative to the previous ratio-based method (Figs. 81 and 82).

The underlying chela height to carapace width relationship is more linear for snow crab, thus specifying a minimum size was not strictly speaking necessary, but was done to maintain conformity with procedures applied to Tanner crab. Based on the same criterion applied for Tanner crab (average size of mature females), we used 50 mm carapace width as the minimum cutoff for mature snow crab.

Proportion mature by 10 mm size bins was then used to calculate an annual maturity curve for both snow and Tanner crab, via the expression

$$M = \frac{1}{1+e^{-a*(W-b)}} \ ,$$

where M is proportion mature, W is the mid-point of a given size bin, a is a model parameter, and b is the parameter representing model estimated size at 50% maturity. This maturity curve may then be applied to size-incremented estimates of abundance and biomass to calculate mature male estimates.

RESULTS

Survey Overview

The 2019 EBS bottom trawl survey consisted of 375 total bottom trawls conducted from 3 June to 28 July over an area of approximately 140,350 nmi^2, beginning in the southeast corner of Bristol Bay, moving east to west, and finishing with the northernmost stations. The latitude and longitude of the midpoint of each successful tow along with the duration (h), distance fished (km), bottom depth (m) and bottom temperatures (°C) are listed in the Appendix. The mean distance fished across all tows was 1.49 nmi (2.76 km, SD = 0.14 nmi) with a range of 0.61 to 1.70 nmi (1.14 to 3.15 km) and the mean tow duration was 30.6 minutes (SD = 2.78 min, range = 12.4 to 33.4 min). The fishing depth of the 83-112 Eastern otter trawl ranged from 17 to 174 m with a mean gear depth of 78.4 m (SD = 33.7 m). The mean net width per tow ranged from 13.2 to 20.5 m and the average mean net width for all 375 standard successful tows was 16.8 m (SD = 1.2 m). The 2019 net fishing performance (distance fished, tow duration, gear depth, net width) was consistent with previous years with the exception of 1975, when tow duration was 60 minutes and mean distance fished was 2.26 ± 0.18 nmi.

In addition to the standard survey, three additional test stations (Q-32, P-33, and O-32) were sampled on the northwestern shelf break (not shown in figures). Initial results indicate low crab abundance (O-32: 1 snow crab; P-33: 69 snow crab and 2 Tanner crab; Q-32: 28 snow crab and 1 Tanner crab). These test stations are not included in any of the analyses presented in this document.

The bottom temperature at each station during the standard survey ranged from -0.3 °C to 9.7 °C (Fig. 5). A cold pool of water < 2°C extended onto the middle shelf between the 50 and 100 m isobaths northwest of St. Matthews Island, which was similar in extent to what was observed in 2018, but retracted relative to 2017 and most historical conditions. Warmer bottom temperatures were observed around the Pribilof Islands, and especially high temperatures in the shallow waters north and east of Bristol Bay, and around Nunivak Island. In 2019, the average bottom water temperature during the first survey leg (3 June to 18 June) was 5.7 °C (SD = 1.4), which was over a degree warmer than during leg 1 in 2018 (4.6ºC; SD = 0.5) (Table 8 and Fig. 6).

Population abundance and biomass of the seven commercial crab stocks sampled during this survey fluctuated dramatically from 1975 to 2019 (Figs. 8-12). Overall commercial crab mature male biomass decreased from approximately 300,000 t to below 100,000 t in the mid-1980s, before then increasing to just below 500,000 t in the early 1990s due to increases in snow and Tanner crab. Total mature male biomass then leveled out around 200,000 t between 2005 and 2015, but dropped to approximately 100,000 t in 2017 and 2018 (Fig. 7). At about 88,000 t, mature male biomass for commercial crab stocks in 2019 is the second lowest on record, and the lowest since 1985.

Nine special projects were conducted in addition to the standard assessment survey to collect specific biological data from particular crab species (Table 4). Seven of the projects originated from the AFSC:

1) Collect Tanner and snow crab blood samples at four index sites each to monitor bitter crab syndrome in support of an on-going monitoring program.
2) Collect live Tanner crab to evaluate the effects of bitter crab syndrome on gene expression.
3) Collect female snow crab to assess annual versus biennial reproductive cycles.
4) Collect Tanner and snow crab to evaluate the variability in shell structure and calcification in response to ocean acidification across the spatial distribution of these stocks.
5) Collect immature snow crab that are nearing maturity across six regions to assess body condition and lipid allocation.
6) Collect live, mature, egg-bearing female snow and Tanner crab for studies with larval growth and hatching, and
7) Collect crab specimens for the observer training collection.

In addition to these, two special projects originated from ADF&G:

1) Collect Tanner blood samples at eight sampling sites to evaluate fine-scale population genomic structure, and
2) Collect live snow crab for studies of black eye pathology and record instances of black eyes in measured Tanner and snow crab.

To assess the prevalence of bitter crab syndrome, 748 snow and 684 Tanner crab blood samples were collected from eight index sites. Four-hundred live Tanner crab were collected for a study of immune genes and their expression responses to *Hematodinium* sp. infection. Approximately 350 snow crab were collected for the annual versus biennial reproduction study. Approximately 300 snow crab and 85 Tanner crab were collected in support of the effort to study effects of ocean acidification on shell condition and calcification in the natural environment, while 100 juvenile snow crab were collected for the body condition study. For both snow and Tanner crab 18 live egg-bearing females were collected. Twenty-eight crab specimens were collected for the observer training collection. For the ADF&G projects 85 blood samples were taken from Tanner crab and approximately 50 snow crab were collected for black eye studies. Chela heights were measured for maturity estimates; 1,667 male Tanner crab and 2,173 male snow crab chela heights were measured in 2019. All collections were completed within the guidelines stipulated by the ADF&G collection permit for each project (CF-19-032, CF-19-049, CF-19-092, and CF-19-059).

Bristol Bay District Red King Crab

Red king crab (*Paralithodes camtschaticus*) were caught at 67 of the 136 stations in the Bristol Bay management district in 2019. Similar to historical trends over the last 30 years, Bristol Bay red king crab were caught at an average depth of 56.1 m (SD = 13.1 m). The density of legal-sized male crab caught at a station ranged from 70 to 673 crab nmi^{-2} (see Appendix). Legal-sized male Bristol Bay red king crab were caught at 42 stations (Table 5; Fig 13), resulting in a total biomass estimate (± 95% CI) of 8,965 ± 3,109 t (Table 6) and a total abundance estimate (± 95% CI) of 2.9 ± 1.0 million crab (Table 7) in the Bristol Bay District. The majority of legal males were concentrated in the central sections of Bristol Bay (Fig. 13). The 2019 estimated biomass of legal-sized males is lower than last year, and lower than the 20-year average of 28,047 ± 4,734 t

(Table 6). Sixty-two percent of legal-sized males were new hardshell crab and 38% were oldshell and very oldshell crab with the majority of oldshell males caught in central Bristol Bay (Fig. 18a). There was an increase in the percentage of legal-sized new hardshell males from last year (35% new hardshell in 2018; Fig. 17).

Red king crab mature males were encountered at 53 of the 136 surveyed stations, and were well distributed, with no one station dominating in abundance (Figs. 14 and 16). One-hundred percent of the 164 mature males and 121 immature males caught were measured (Table 5). The estimated biomass of 12,431 ± 3,959 t for mature males is 82% of the total male biomass in 2019, with immature male red king crab estimated at 2,793 ± 1,194 t (Table 6). The majority of both size categories were located in the central and northern Bristol Bay District (Fig. 14). Compared with 2018, the 2019 mature male biomass decreased, while abundance had a moderate increase (Tables 6 and 7), suggesting new crab becoming mature. Immature male abundance and biomass both declined slightly relative to 2018.

One of the sampling objectives of this multi-species bottom trawl survey is to assess the mature red king crab population when mature females are carrying newly extruded, uneyed embryos after completion of the molt-mate cycle (Otto 1986). Embryo development and larval hatching in female red king crab, followed by the molting and mating cycle, are delayed in years with cold bottom water temperatures (Chilton et al. 2010, Shirley et al. 1990, Stevens and Swiney 2007, Dew 2008). During years with colder than average bottom temperatures (1999, 2000, and 2006-2012, 2017), the ratio of eyed to uneyed embryos encountered in mature females on the survey in June was higher compared to warmer years (2001-2005, 2013-2016, 2018) (Table 8). The eyed to uneyed embryo ratio ranged from 6.68 to 0.63 in cold years, compared to 0.06 to 0.00 in the warmer years. The ratio of eyed to uneyed embryos in mature females decreased dramatically when the Bristol Bay stations were resampled in cold years, ranging from 0.06 to < 0.01, and indicating that the majority of mature females completed the mating and molting cycle (Table 8).

To determine whether it is necessary to re-tow the Bristol Bay red king crab stations, the reproductive condition of the mature female red king crab are assessed. The determination that the molting and mating cycle has been delayed is made when high numbers of oldshell mature females either brooding eyed embryos, which were fertilized from the previous season, or with pleopods exhibiting empty egg cases, are encountered during the first leg of the survey.

The relatively warm water temperatures in 2019 did not delay the molting and mating cycle in mature red king crab. Of the 270 mature females sampled, 269 had extruded a new clutch of uneyed embryos before the standard survey, while 1 mature females had empty egg cases (Figs. 18b and 20). Average bottom temperature of Bristol Bay stations with mature female red king crab in June was 5.2^{o} C in 2019, which is half a degree warmer than the same period in 2018 (Table 8). Consequently, Bristol Bay stations were not resampled in 2019. Ninety-nine percent of mature females had new hardshells.

The 2019 mature female red king crab biomass estimate of 13,088 ± 4,757 t (Table 6) and abundance estimate of 8.4 ± 3.1 million crab (Table 7) is 97% of the total female biomass, with immature female red king crab biomass estimated at 351 ± 186 t (Table 6). Mature female abundance estimates were lower in 2019 compared to 2018, although biomass estimates

increased, indicating an aging population of mature female crab. Mature female abundance and biomass were however well below the previous 20-year average of 25.5 ± 3.8 million crab and 32,450 ± 4,646 t (Fig. 19; Tables 6 and 7). Both immature female abundance and biomass decreased relative to 2018. The majority of the mature female red king crab were caught in the central area of Bristol Bay, while immature females were more abundant in northeastern Bristol Bay (Figs. 15 and 18a).

Spatial distributions of red king crab have fluctuated since the beginning of the trawl survey. The centers of distribution for mature male and female red king crab shifted north and east of the southwest Bristol Bay region from 1980 to 1987 (Fig. 21). From 1988 to 1991, the mature female distribution slightly shifted south before returning to the northeastern distribution while males remained in the northeast. Loher and Armstrong (2005) hypothesized that the shift during the late 1970s and early 1980s was due to warmer bottom temperatures. However, an alternative hypothesis suggests that the disappearance of the southwestern portion of the population near the Unimak region during the late 1970s and early 1980s was caused by fishing effects (Dew and McConnaughey 2005). In more recent years when the cold pool extended onto the Bristol Bay shelf area (from 2008 to 2012, and 2017), the distribution of mature females and males moved from the central area of Bristol Bay to the nearshore areas along the Alaska Peninsula supporting the temperature hypothesis (Chilton et al. 2010). This may be because females avoid water cold enough to delay embryogenesis during brooding (Stone et al. 1992). The centers of distribution for mature males and females in 2019 were both in central Bristol Bay, just north of the 50 m isobath. The male center of distribution was similar to 2018, while female distribution was approximately 30 nmi west relative to 2018 (Fig. 21).

The location of ovigerous females at larval release may impact post-larval settlement success and recruitment strength in subsequent years. Southwestern Bristol Bay has long been considered the most important larval release site for females since larvae are expected to drift into favorable juvenile habitat in nearshore Bristol Bay (McMurray et al. 1984, Armstrong et al. 1993, Dew and McConnaughey 2005). Thus under this hypothesis, increased settlement is expected in cold years relative to warm years (Evans et al. 2012). High year-class strengths in the 1970s occurred when the spawning stock was located in southern Bristol Bay (Armstrong et al. 1993), while the low abundances starting in the mid-1980s could have been caused by the warmer bottom temperatures and potentially related adult spatial shift. However, despite relatively cold years in 2008-2012, and an associated extended cold pool, estimated population abundance has remained low. A recent study modeling larval trajectories under different climate scenarios, suggests that southwestern Bristol Bay is not the ideal hatching area previously hypothesized (Daly et al. 2018). Modeled larvae that hatched in central and nearshore Bristol Bay were more likely to settle in good habitat and greater larval retention was found in warm years (Daly et al. 2018).

Pribilof District Red King Crab

Historically, red king crab were not abundant in the Pribilof District and landings were taken incidentally during the blue king crab fishery. The red king crab fishery first opened in 1993 while the fishery for blue king crab was closed. A combined fishery for both red and blue king crab occurred in the Pribilof District from 1995 through 1998, but due to low abundance of blue

king crab, both the combined fishery and the red king crab fishery have remained closed since the 1998-1999 season (Gish 2006).

Red king crab were caught at 17 of the 77 stations in the Pribilof District in 2019, most of which were in the high-density sampling area (Figs. 24-26). Pribilof District red king crab were caught at an average depth of 66.4 m (SD = 6.6 m), which is slightly deeper than the long-term average (56.0 m). The density of legal-sized males caught at a station ranged from 72 to 407 crab nmi^{-2} (Appendix). Legal-sized male red king crab were caught at 8 of the 77 stations in the Pribilof District (Table 5, Fig. 24), with a biomass estimate (± 95% CI) of 1,101 ± 895 t (Table 9), and an abundance estimate (± 95% CI) of 0.3 ± 0.3 million crab (Table 10). Legal-size males represented 46% of the total male estimated biomass and were well below the average of 5,599 ± 2,717 t from the previous 10 years (Table 9). Similar to the previous year, 60% of legal-sized males were new hardshell, and 40% were oldshell (Fig. 28).

Mature males were encountered at 12 of the 77 stations in the Pribilof District, most of which were in the high-density sampling area (Figs. 25 and 27). All of the 46 mature and 13 immature males caught were subsequently measured (Table 5). Two stations (IH2120 and H-20) accounted for 44% of all mature red king crab caught (Figs. 25 and 27). The biomass estimate of mature males was 2,086 ± 1,406 t, and represented 88% of the total male biomass (Table 9) with the remaining 12% represented by 293 ± 363 t of immature male red king crab (Table 5). Mature males were distributed around St. Paul Island in the nearshore shallow water stations, and to the north, south, and east of St. Paul Island (Fig. 25).

The 2019 biomass estimate of mature red king crab females was 797 ± 624 t, while estimated abundance was 0.6 ± 0.5 million crab. Mature females represented 98% of the total female biomass collected during the survey (Tables 9 and 10). Female biomass estimates are imprecise due to the limited number of tows with positive crab catches (Fig. 26; Appendix), and 2019 estimates indicate mature female biomass was at 69% of the average over the previous 10 years (Figs. 9 and 27). One-hundred percent of the mature females were new hardshell between 104 and 148 mm CL, and 94% of the mature females were carrying either 75% or 100% full clutches, all with uneyed embryos (Fig. 30). Only one immature female was caught in 2019 (Fig. 26).

The centers of distribution for both males and females have moved outside a 40 nmi × 40 nmi region around St. Paul Island (Fig. 31). The center of the red king crab distribution moved to within 20 nmi of the northeast side of St. Paul Island as the population abundance increased in the 1980s, and remained in that region until the 1990s when the distribution moved closer to St. Paul Island. Centers of distribution in 2018 and 2019 were located toward the northeast, and were further away from St. Paul Island relative to any time in the previous two decades.

The specific recruitment mechanisms driving population fluctuations in the Pribilof District red king crab stock are currently unknown. It is however generally acknowledged that climate change impacts marine ecosystems, including Bering Sea crab and fish species. A climatic regime shift took place in the North Pacific Ocean during the winter of 1976-77, which was characterized by an abrupt transition from a negative to positive Aleutian Low Pressure Index (ALPI) and Pacific Decadal Oscillation (PDO) resulting in warmer air and sea surface temperatures relative to pre-1977 conditions. After the 1977 regime shift, a slight increase in

Pribilof District red king crab occurred followed by a larger increase in the 1990s (Figs. 32 and 33). Biomass and abundance of mature male Pribilof red king crab increased in 2019 relative to 2018, but remain well below all other years in the proceeding decade (Fig. 12).

Pribilof District Blue King Crab (including total stock boundary)

Blue king crab (*Paralithodes platypus*) were caught at 6 of the 86 stations in the Pribilof stock boundary area in 2019, all in the high-density sampling area (Figs. 34-36). Pribilof District blue king crab were caught at an average depth of 68.1 m (SD = 6.4 m), which has been similar over the last 30 years. The 2019 biomass estimate (± 95% CI) of legal-sized males was 204 ± 241 t (Table 11, Fig. 34), and abundance was 0.1 ± 0.1 million crab (Table 12), representing 64% of the total male biomass and below the average of 463 ± 220 t for the previous 20 years (Tables 11-12 and Fig. 38).

Blue king crab mature males were caught at 3 of the 86 stations in the Pribilof stock boundary area, and all of the three mature males and eight immature males caught were measured (Table 5; Figs. 35 and 37). The mature males were also all of legal size, consequently the abundance and biomass estimate are the same as for legal males. An additional 114 ± 121 t of immature male blue king crab was estimated within the Pribilof stock boundary area (Tables 5 and 11). Immature male blue king crab were captured to the northeast of St. Paul Island, where mature and legal-sized male crab were distributed northeast and southeast of St. Paul Island (Figs. 34, 35, and 37). In 2019, all of the sampled legal-sized males were new hardshell (Fig. 39).

Eleven mature female blue king crab were caught in the Pribilof stock high-density sampling area, which extrapolated to a biomass estimate of 407 ± 685 t (Table 11) and an abundance estimate of 0.3 ± 0.5 million crab (Table 12), and represents 100% of the total female estimated biomass (Fig. 36). Estimates of female biomass are imprecise due to their preference for rocky habitat that is difficult to sample with bottom trawls. Blue king crab females are predominantly biennial spawners with only a portion of the female population carrying eyed embryos in a given year, while the remainder are in a non-embryo-bearing phase (Somerton and Macintosh 1985). All mature female blue king crab sampled in the Pribilof stock boundary area were new hardshell and brooding uneyed embryos, with clutches that were either half full or three-quarters full (Fig. 40).

The centers of distribution for both male and female blue king crab are located within a 40 nmi × 40 nmi region east of St. Paul Island (Fig. 41). The center of the blue king crab distribution moved to within 20 nmi of the northeast side of St. Paul Island as the population abundance decreased in the 1980s before moving easterly in the 1990s. In 2019, the mature male and female centers of distribution were located approximately 30 nmi east and southeast, respectively, of St. Paul Island.

Pribilof blue king crab production was higher in the late 1970s and early 1980s, and increased in the 1990s with female abundances at an all-time high in 1980 (Figs. 42 and 43). A pulse of male and female blue king crab in the 55-60 mm CL size class was seen in 2005, yet this cohort was not observed in subsequent years. Overall, male and female blue king crab abundances have been

extremely low in recent years with no evidence of increasing. Apparent increases observed in mature and legal male biomass estimates for 2019 relative to 2018 are driven primarily by an abbreviated, but still valid tow, which had the effect of artificially increasing the CPUE calculated for the affected station.

St. Matthew Island Section, Northern District Blue King Crab

The blue king crab fishery in the St. Matthew Island Section of the Northern District opened in 2009 after a 10-year rebuilding plan, but was then closed on and off over the next several years, and has remained closed since 2016. In 2019, blue king crab were caught at 13 of the 56 total stations in the St. Matthew Island Section sampling strata, primarily in the high-density area (Table 5, Figs. 44-46). St. Matthew Island blue king crab were caught at an average depth of 68.3 m (SD = 14.0 m), which is within the 30-year average depth (82.1 m; SD = 29.9 m). Fifty-nine legal-sized male blue king crab were caught in 2019 with a biomass estimate (± 95% CI) of 2,304 ± 1,483 t (Table 13, Fig. 44) and abundance estimate (± 95% CI) of 1.2 ± 0.8 million crab (Table 14). Legal males represented 63% of the total male estimated biomass, which is slightly above the average of 2,300 ± 555 t from the previous 20 years (Table 13). In 2019, 52% of the legal-sized males were new hardshell crab, and the two stations with the highest catches were at the southeast corner (Q-23 and QP2423) of St. Matthew Island (Figs. 44 and 49).

Mature male blue king crab were caught at 10 of the 56 stations surveyed in the St. Matthew Island Section sampling strata, and all of the 83 mature and 100 immature males caught were measured (Table 5, Figs. 45 and 47). The mature male biomass estimate in 2019 was 2,879 ± 1,892 t, representing 79% of the total male estimated biomass, while the immature male biomass was estimated at 765 ± 831 t (Table 13). Overall St. Matthew Island blue king crab immature and mature male abundance increased in 2019 compared to 2018 and 2017 (Table 8; Fig. 48). However, the 2019 abundance of pre-recruit male crab in the 105-119 mm size class was approximately half the size of the previous 20-year average (1.0 ± 0.2 million crab; Fig. 12).

Historically, one station (R-24) has greatly impacted population estimates for St. Matthew Island blue king crab, but this was not the case in 2018 or 2019 (Figs. 45 and 47). Mature males were much more evenly distributed throughout the high-density area, where the highest percentage of mature males caught at one station was 21% at station Q-23. The majority of mature males were caught south of St. Matthew Island (Figs. 45 and 47). Fifty-seven percent of the immature male blue king crab were caught at one station (Q-23) east of St. Matthew Island, while most other immature males were found at stations adjacent to the southern side of St. Matthew Island.

The 2019 mature female blue king crab biomass estimate was 389 ± 481 t and abundance was 0.8 ± 1.0 million crab (Tables 13 and 14). Only 13% were hard new hardshell, while the remaining 87% were oldshell. Over 60% of the immature and mature female blue king crab were caught at one station (Q-23) east of St. Matthew Island (Fig. 46). One hundred percent of immature females were new hardshell crab (Fig. 50). Eighty-seven percent of mature females were barren, with 75% of these females possessing empty egg cases. All females with clutches had uneyed eggs and clutches that were 75% full (Fig. 50).

The centers of distribution for both male and female blue king crab are located within a 30 nmi × 30 nmi region around St. Matthew Island (Fig. 51). The center of the blue king crab distribution has moved haphazardly within this region without a clear pattern of neighboring years being proximal to each other. In 2019, the mature male center of distribution was approximately 15 nmi south of St. Matthew Island, while the mature female center of distribution was very near St. Matthew Island (Fig. 51). NMFS survey abundance estimates for St. Matthew blue king crab do not exist prior to 1978. As such, production and distribution cannot be compared in terms of before versus after the 1977 regime shift.

Tanner Crab

In 2011, the ADF&G Board of Fish changed the legal-size limit of Tanner crab from ≥ 5.5 inches CW (138 mm, without spines) to ≥ 4.4 inches CW (110 mm, without spines) west of 166° W and ≥ 4.8 inches CW (120 mm, without spines) east of 166° W (Table 1). According to the regulatory harvest strategy of the State of Alaska (5 AAC 35.508), the annual TAC for Tanner crab in both areas is determined by the biomass estimate of males ≥ 125 mm CW. Although the harvest strategy is based on the assumption that the commercial fishery will target legal size crab (Zheng and Pengilly 2011), the industry self-imposes retention of crab ≥ 4.9 inches CW (125 mm, without spines) east and west of 166° W due to marketing concerns. We provided the 2019 biomass estimates for the two legal-size categories, as well as for ≥ 4.9 inches CW east and west of 166° W in the abstract.

Tanner crab were caught at 76 of the 120 stations east of 166° W (Figs. 54-56), and 164 of the 255 stations west of 166° W. Among those stations west of 166°W, Tanner crab occurred at 41 and 11 stations within the high-density areas of the Pribilof District and St. Matthew Island Section, respectively (Figs. 54-56; Appendix). Tanner crab were caught at an average depth of 68.6 m (SD = 20.6 m) east of 166° W, and 98.2 m (SD = 31.0 m) west of 166° W, which are similar to what has been observed throughout the entire time series.

Legal-sized Tanner crab were caught at 56 of the 120 stations east of 166° W, and 87 of the 255 stations west of 166° W (Table 5, Fig. 54). One-hundred percent and 98% of the legal-sized males caught east and west of 166° W, respectively, were measured (Table 5). In 2019, 91% and 43% of sampled legal-sized males were either oldshell or very oldshell east and west of 166° W, respectively (Fig. 60).

The 2019 biomass estimate (± 95% CI) for legal male Tanner crab east of 166° W was 5,521 ± 2,138 t (Table 15), with an associated abundance estimate of 7.5 ± 2.8 million crab (Fig. 17). Eighty-six percent of legal males were ≥ 4.9 inches CW, with a biomass estimate of 4,769 ± 1,939 t (6.1 ± 2.4 million crab; Tables 15 and 17). The 2019 estimated biomass of legal Tanner crab in the eastern area was below the previous 20-year average biomass of 12,911 ± 2,939 t. The majority of the legal Tanner males (≥ 120 mm CW) occurring east of 166° W were distributed in the southwest sections of Bristol Bay (Fig. 54).

The 2019 biomass estimate for legal male Tanner crab west of 166° W was 8,749 ± 2,452 t (Table 19), while abundance was estimated at 14.6 ± 4.0 million crab (Fig. 21). Fifty-seven

percent of legal males were ≥ 4.9 inches CW, for a biomass estimate of 5,001 ± 1,563 t (6.9 ± 2.1 million crab; Tables 19 and 21). The 2019 estimated biomass of legal Tanner crab in the western area was well below the previous 20-year average biomass of 18,083 ± 4,591 t. The majority of legal Tanner males (≥ 110 mm CW) occurring west of 166° W were distributed around the Pribilof Islands (Fig. 54).

In the areas east and west of 166°W mature and immature male abundance declined from 2018 (Tables 17 and 21). However, biomass of immature Tanner crab in the eastern stock increased, likely due to the increase in new hardshell crab within the 75 – 105 mm size classes (Fig. 58). Mature and immature Tanner crab were primarily distributed in the southwest section of the EBS shelf at depths greater than 50 m, while immature crab generally occurred closer to the shelf break (Fig. 57).

The 2019 mature female Tanner crab biomass estimates east and west of 166° W were 652 ± 437 t, and 4,113 ± 1,984 t (3.7 ± 2.5 and 32.9 ± 17.2 million crab), respectively, while the immature female Tanner crab estimated biomasses east and west of 166°W were 1,481 ± 956 t and 3,339 ± 1,212 t, respectively (Tables 5, 16 - 22). Fourteen percent of the mature female population were distributed east of 166° W in the ADF&G eastern management district, within the central and southwestern areas of the Bristol Bay District (Fig. 56). In the eastern area only, less than 5% of the sampled mature females were molting or softshell, while 55% were new-hardshell and 41% were either oldshell or very oldshell (Fig. 63). In the western area only, less than 3% of the mature females were molting or softshell, while 56% were new-hardshell and 42% were oldshell or very oldshell (Fig. 64). In the eastern region 96% of the mature sampled females carried newly extruded embryos, with the remaining 4% barren (Fig. 63). In the western region, 90% of the mature sampled females carried newly extruded embryos, 9% were barren, and 1% had eyed eggs or had not yet produced a new clutch (Fig. 64). In the eastern and western regions, 79% and 72% of mature females had clutches that were either full or three-quarters full, respectively (Figs. 63 and 64).

Pulses of strong recruitment to the mature male and female population appear to have been cyclical throughout the eastern Bering Sea (Figs. 61 and 62), yet it is unclear what environmental conditions triggered the pulses, or if strong cohorts are sequentially linked as theorized for snow crab (Ernst et al. 2005, Ernst et al. 2012, Parada et al. 2010). Shell condition can be used to infer whether mature female Tanner crab are primiparous (first clutch of eggs) or multiparous (subsequent clutches). For example, mature new hardshell female crab are assumed to be primiparous (first clutch of eggs) and likely molted to maturity during the prior winter (Ernst et al. 2005).

The shell condition time series amply demonstrates that the survey fails to detect portions of the population. For example, the population estimate of new hardshell female Tanner crab east of 166° W was 37 million in 1990, yet the estimate of oldshell mature females was 76 million in 1991 (Fig. 61). Assuming new hardshell females become oldshell the following year, estimates of oldshell females should be at or below levels of new hardshell females the year prior. Further, the shell condition time series for mature male Tanner crab should be interpreted with caution, as physiological, morphological, and functional male maturity vary by size. In most of the historical survey data, it is not possible to differentiate morphologically mature and immature males. Thus,

a size cutoff is suboptimal for assessment of mature crab, and future research will strive to refine the accuracy of estimating mature population abundances.

The centers of distribution for both males and female Tanner crab have moved within a 160 nmi × 100 nmi region east of the Pribilof Islands and west of Bristol Bay (Fig. 65). The centers of distribution moved from the eastern extent of the distribution in the 1970s to the western extent in more recent years.

There is little evidence of changes in Tanner crab production related to the 1977 regime shift (NPFMC 2016), yet pulses of strong production have been cyclical from 1975 to the present (Figs. 66-69). A less pervasive regime shift occurred in 1989, as characterized by briefly negative ALPI and PDO indices, but the system did not return to pre-1977 conditions. A slight increase in Tanner crab production coincided with the 1989 shift, although the links between climate and crab production remain speculative. Male pre-recruit abundance for east and west of 166° W has declined over the past several years and for 2019 the pre-recruit abundance is below the average over the past 20 years (Fig. 12).

Snow Crab

Although the legal minimum size limit for male snow crab is 3.1 inches CW (78 mm), processors currently prefer a minimum size of 4.0 inches CW (102 mm), due to economic considerations. The biomass estimates for male snow crab are reported for both legal and preferred size categories in the abstract.

Snow crab were caught at 251 of the 375 stations in the combined areas of the Bristol Bay District, Pribilof District, and St. Matthew Island Section sampling strata (Figs. 70-72). In 2019 snow crab were caught at an average depth of 87.2 m (SD = 29.2 m), similar to what has been observed throughout the history of the survey.

Legal-sized snow crab were caught at 233 of the 375 standard stations, and 26% of the legal-sized males caught were measured (Table 5, Fig. 70). Legal-sized male snow crab estimated biomass (± 95% CI) was 175,907 ± 59,240 t (Table 23) and abundance was 611.1 ± 213.6 million crab (Table 25), which was 29% of the total male abundance. This biomass was higher than the 20-year (1999-2018) average legal male snow crab biomass of 106,484 ± 15,277 t. Sixteen percent of the legal male biomass was for crab ≥ 4.0 inches CW with a biomass estimate of 28,955 ± 10,145 t (53.7 ± 19.1 million crab).

Legal males (≥ 78 mm CW) were distributed throughout the EBS survey area in waters deeper than 50 m, especially in the area between the Pribilof Islands and St. Matthew Island, and at the northern extent of the survey (Figs. 70 and 75). Among sampled legal-sized male crab in 2019, < 1% were in molting or softshell condition, while approximately 94% were in new hardshell condition and 6% were oldshell (Figs. 74 and 75). Oldshell crab were generally in deeper waters, primarily distributed between the 100 and 200 m isobaths within the EBS region (Fig. 75).

Mature male abundance and biomass estimates in 2019 are both higher than those for the past 4 years, but remain below the average for the previous 10-years. Pre-recruit abundance and biomass, which are higher than the past 3 years, are in fact the highest on record since the 1990s (Figs. 8-9, 12, and 79). An increase in juveniles that was first observed in the 30 to 55 mm juveniles in 2016, may be beginning to mature (Figs. 74, and 79). Although large peaks in juveniles occurred over the past 3 years, little new recruitment in the 30 – 55 mm size classes is evident in 2019 (Fig. 74) and juvenile male abundance is 30% of that observed in 2018.

The mature female snow crab biomass estimate of 106,799 ± 41,236 t and abundance estimate of 2,041 ± 786 million crab was 95% of the total female estimated biomass (Tables 24 and 26). Mature female abundance and biomass are lower than 2018 estimates, and similar to the previous 10-year average (Figs. 10-11, and 80). Among sampled mature females, 77% were in new-hardshell condition, and 23% were oldshell or very oldshell condition (Fig. 77). Ninety-seven percent of the mature females were brooding new embryos, while 2% were barren and less than 1% had eyed embryos, dead embryos, or empty egg cases (Fig. 77). Eighty-seven percent of mature females had clutches that were full or three-quarters full (Fig. 77).

The 2019 immature female crab biomass estimate was 5,125 ± 4,349 t, which is an order of magnitude lower than the previous 3 years, and is the lowest on record since 1982 (Table 24). Because such a precipitous drop was not observed in immature males, and it was not reflected by an increase in the mature female population, it is unclear whether this interannual decrease represents an actual mortality event, or is an artifact of the survey simply not coinciding with the distribution of these females, resulting in their population segment not being adequately sampled.

Ovigerous female snow crab held in water with temperatures below 1.5 °C undergo a two-year, biennial reproductive cycle in the Bering Sea (NPFMC 2016). Consequently, environmental conditions relating to temperature, including the extent of the cold pool, are likely to regulate recruitment strength via the relative numbers of annual to biennial spawners, and individual fecundity of the female crab.

Pulses of strong recruitment to the mature female population have been cyclical (Fig. 76), and it has been hypothesized that strong cohorts are sequentially linked (see Ernst et al. 2012, Parada et al. 2010 for a detailed discussion). As with Tanner crab, shell condition can be used to infer if mature female snow crab are primiparous (first clutch of eggs) or multiparous (subsequent clutches). Mature new hardshell female crab are assumed to be primiparous (first clutch of eggs), and likely molted to maturity during the prior winter (Ernst et al. 2005). Strong cohorts of mature primiparous females occurred approximately every 7 years beginning in 1980 (Fig. 76), which matches the theoretical time required between egg extrusion of mature females and those offspring reaching maturity (Ernst et al. 2012). It is unknown what specific environmental conditions triggered the initial pulse, or for how long the sequence may last.

As with Tanner crab, the shell condition time series demonstrates that the survey fails to detect portions of the population. For example, population estimates of newshell (shell condition 2) female snow crab were 125 million in 1999, yet estimates of oldshell (shell condition 3) mature females was nearly 1,000 million in 2000 (Fig. 76). Estimates of oldshell females should be at or below levels of newshell females the year prior. As with Tanner crab, the shell condition time

series for mature male snow crab should be interpreted with caution, as physiological, morphological, and functional male maturity vary by size, and it is not possible to differentiate morphologically mature and immature males in most survey data. Future research will strive to refine the accuracy of estimating mature population abundances.

With the exception of 1975 to 1979, the centers of distribution for both male and female snow crab have moved within a 120 nmi × 120 nmi region between St. Matthew Island and the Pribilof Islands (Fig. 78). The center of snow crab distribution moved dramatically to the northwest after 1979. Since then, the centers of distribution have moved throughout the region, with males having a broader distribution, while females are located more to the north. The 2019 mature male center of distribution was located between St. Matthew Island and the Pribilof Islands, while the mature female center of distribution was located near St. Matthew Island (Fig. 73).

Distribution-based determination of male *Chionoecetes* spp. maturity status: Results

Beginning with the 2018 edition of the Technical Memorandum for commercial crab species (Lang et al., 2019), we presented estimated abundances of newly morphometrically mature male *Chionoecetes* spp., as determined by comparison of their chela heights versus carapace widths (Tables 15, 17, 19, and 21).

The custom procedure demonstrates minimal misclassification rates within the region of overlap between morphometrically mature and immature groups relative to the previous ratio-based method (Figs. 81 and 82). Consequently, it can be considered to offer superior performance to the ratio-based method previously applied in graphical analyses in this document.

Initial abundance and biomass estimates for mature males based on maturity curves derived from this procedure are provided for all years with chela measurements in Tables 19 and 21 (Tanner crab) and 23 and 25 (snow crab), under the "Mature male distribution method" heading. Estimates of mature male biomass and abundance derived using this procedure may be larger or smaller than those based on the established size cutoffs. Excepting the minimum cutoff, the chela-based maturity curve allows much smaller crab to be classified as mature than the established size cutoffs (95 mm carapace width for snow crab, and 103/113 mm carapace width for Tanner crab west/east of 166° W). In addition, larger crab can be classified as immature. This suggests significant misclassification by the fixed maturity cutoffs and potential underestimation or overestimation of the mature male segments of these stocks, depending on the year in question.

Please note that beyond the specified table columns and graphics, all other references to mature males in this document refer to established maturity classifications employing fixed carapace-size-based cutoffs.

Chionoecetes spp. Hybrid

Chionoecetes spp. hybrid crab were caught at 94 of the 375 stations in the combined areas of the Bristol Bay, Pribilof, and Northern Districts (Figs. 84-86; Appendix A) at an average depth of 90.2 m (SD = 29.6).

In this document, *Chionoecetes* spp. hybrid crab size classes for legal and mature males and mature females are based on the size categories for snow crab (see Snow Crab section and Table 1). Legal-sized male *Chionoecetes* spp. hybrid crab were caught at 67 stations, throughout all districts combined, resulting in a biomass estimate (± 95% CI) of 2,993 ± 1,086 t, and were primarily distributed north of the Pribilof Islands between 50 and 100 m (Fig. 84). Seventy-one percent of those legal males were ≥ 4 inches in carapace width, with a biomass estimate of 2,128 ± 823 t, with most being either new hardshell or oldshell (Fig. 88). Mature and immature male *Chionoecetes* spp. hybrid crab were also primarily distributed north of the Pribilof Islands (Figs. 85 and 87).

The 2019 mature female *Chionoecetes* spp. hybrid crab biomass estimate was 289 ± 207 t, and the immature female crab biomass estimate was 20 ± 14 t. The majority of the mature and immature female *Chionoecetes* spp. hybrid crab were distributed southwest of St. Matthew Island, and around the Pribilof Islands between 100 and 200 m isobaths (Fig. 86).

Other Crab Stocks and Species of Interest

Northern District Red King Crab

Red king crab were caught at 12 stations in the Northern District (Fig. 89) outside of the current management units where red king crab are commercially fished (Fig. 5). Legal-sized males were caught at four of those stations, and the density at a station ranged from 74 to 82 crab nmi^{-2} (Appendix). The 2019 biomass estimate (± 95% CI) of legal-sized males was 340 ± 293 t, while the biomass estimates for mature and immature males were 498 ± 311, and 82 ± 96 t, respectively. The biomass estimate of mature female red king crab was 586 ± 428 t. The majority of mature male and mature female red king crab were caught near the 50 m isobath at stations south and west of Nunivak Island (Fig. 89).

Northern District Blue King Crab

No Northern District blue king crab were caught in 2019 (Fig. 90).

Hair Crab

In this report, legal male hair crab (*Erimacrus isenbeckii*) are defined as > 3.25 inches CW (≥ 83 mm CL), which was specified in the previous Pribilof District fishery, while the female hair crab biomass estimate is presented for all sizes and maturity states combined. Hair crab were caught at 19 of the 375 stations throughout all districts combined on the survey (Fig. 91). The 2019 density of legal male hair crab caught at a station ranged from 59 to 1,672 crab nmi^{-2}, resulting in a biomass estimate of 552 ± 238 t (Table 27), and an abundance estimate of 0.8 ± 0.3 million crab (Table 28). Historically, hair crab have been concentrated just north of the

Alaska Peninsula and near the Pribilof Islands. In 2019, legal male hair crab were primarily concentrated southwest of Nunivak Island along the 50 m isobath (Fig. 91).

The 2019 sublegal male hair crab biomass estimate (± 95% CI) was 459 ± 382 t, while the female hair crab biomass estimate was 147 ± 89 t (Table 27). Sublegal males were primarily caught southwest of Nunivak Island (Fig. 91).

The Pribilof District hair crab fishery has been closed since 2000 due to a shift in the distribution of legal males to the Northern District and, after one year of experimental fishing with minimal vessel participation, the Northern District fishery was closed in 2001 (Fitch et al. 2012). Biomass estimates of legal male hair crab increased between 2005 and 2013, before declining every year from 2014 to 2019 (Table 27).

Golden King Crab – All Districts

No golden king crab were caught in 2019.

NORTHERN BERING SEA EXTENSION OF THE 2019 STANDARD SURVEY

Northern Bering Sea Survey Overview and Data Collection

The northern Bering Sea extension of the 2019 EBS standard survey (NBS) consisted of 144 total bottom trawls conducted from 28 July to 20 August 2019, and covered an area of approximately 58,145 nmi^2 (Fig. 92). The survey was conducted immediately after the eastern Bering Sea survey onboard the chartered fishing vessels FV *Alaska Knight* and FV *Vesteraalen* (Fig. 92). The latitude and longitude of the midpoint of each successful tow along with the duration (hr), distance fished (km), bottom depth (m), and bottom temperatures (°C) are listed in the Appendix. The mean distance fished was 1.49 nmi (2.76 km, SD = 0.14 nmi), with a range of 0.59 to 1.71 nmi (1.09 to 3.16 km), and the mean fishing time was 31 minutes (0.51 hours, SD = 3 min). The fishing depth of the 83-112 otter trawl net ranged from 12 to 80 m, with a mean gear depth of 38.7 m (SD = 15.4). The mean net width per tow ranged from 13.3 to 21.2 m and the average mean net width for all 144 successful tows was 16.0 m (SD = 1.3 m).

The bottom temperature at each station during the northern Bering Sea survey ranged from -0.6° to 15.3°C (Fig. 93). A cold pool of water < 2°C was present south and west of St. Lawrence Island, with cooler temperatures persisting at stations along the 50 m isobath and deeper. Warmer bottom temperatures were evident in Norton Sound and in shallow waters along the Alaskan coastline (Fig. 93).

One of the 144 trawls (AA-21) was a new test station near the north shore of St. Lawrence Island. This station is not included in the below analyses for each species, although data can be found in Appendix B.

Five special projects were conducted on snow crab in the northern Bering Sea, all of which continued projects started in the eastern Bering Sea (Table 4). These collections were for studies on 1) bitter crab syndrome (200 blood samples), 2) condition (138 crab collected), 3) annual versus biennial reproduction (109 crab collected), and 4) shell structure (~50 crab collected).

Norton Sound Section, Northern Bering Sea Red King Crab

Red king crab (*Paralithodes camtschaticus*) were caught at 22 stations in the northern Bering Sea, 20 of which were in the Norton Sound Section of ADF&G Registration Area Q. Here we define Norton Sound red king crab as those crab in the Norton Sound Section and east of 168° W; red king crab were caught in 19 of 42 stations surveyed in this area (Fig. 97). In this document, we use the red king crab size classifications assigned to the Norton Sound Section. Legal and mature males are defined as ≥ 104 mm CL and ≥ 94 mm CL, respectively (Zheng et al. 2010). Norton Sound red king crab were caught at an average fishing depth of 25.8 m (SD = 6.6 m). The density of legal-sized male crab caught at a station ranged from 77 to 258 crab nmi^{-2} (see Appendix), with the center of the stock distribution located near the northwestern edge of Norton Sound (Fig. 94). Legal-sized male Norton Sound red king crab were caught at 9 stations, resulting in a total biomass estimate (± 95% CI) of 526 ± 457 t and a total abundance

estimate (± 95% CI) of 0.4 ± 0.3 million crab (compared with 1,070 ± 835 t and 0.8 ± 0.6 million crab in 2017; Tables 29 and 30).

The majority of mature males were concentrated on the northwestern edge of the Norton Sound, around stations CC-02 and CC-05 (Figs. 95a and 95b). The estimated biomass of mature crab was 711 ± 539 t, with an associated total abundance estimate of 0.6 ± 0.4 million crab. Immature males were most abundant near the mouth of Norton Sound (Figs. 95a and 95b). The estimated biomass of immature crab was 1,364 ± 736 t, while total abundance was estimated as being 4.8 ± 2.6 million crab (Tables 29 and 30).

The biomass estimate of mature female red king crab in Norton Sound was 240 ± 175 t while the biomass estimate of immature females was 414 ± 320 t (Tables 29 and 30). The majority of mature and immature female red king crab were caught near the mouth of Norton Sound, at its northern edge (Figs. 96a and 96b).

In 2019, 85% of male Norton Sound red king crab were in a new hardshell condition, while 11% and 3% were in old and very old shell conditions, respectively (Fig. 98). Females primarily had new hardshells (97%) and all clutches of gravid females had uneyed eggs. Forty-nine percent of mature females had clutches that were three-quarters full, 19% were half full, 7% were less than half full, and 19% were barren (Fig. 99).

Red king crab had a low abundance outside Norton Sound in the northern Bering Sea. Red king crab were caught at three stations west of 168° W, and were not included in the biomass estimates reported for Norton Sound red king crab in the previous paragraphs (Figs. 94-97).

Northern Bering Sea Blue King Crab

Blue king crab (*Paralithodes platypus*) were caught at 17 of the 144 northern Bering Sea stations in 2019, primarily north of St. Lawrence Island (Fig. 103). For the purposes of this document, size categories for the St. Matthew Island blue king crab stock are applied to the NBS stock, due to the lack of established size categories for this area (Table 1). Legal-sized males were caught in low abundance at stations north of St. Lawrence Island (Fig. 100), with a density ranging from 75 to 86 crab/nmi^2 (see Appendix B). The 2019 biomass estimate (± 95% CI) of legal-sized males was 102 ± 118 t, compared with 1,274 ± 1,013 t in 2017. The biomass estimate of mature and immature males was 565 ± 447 and 122 ± 156 t, respectively (Tables 31 and 32). The majority of immature males were off the northern coast of St. Lawrence Island, while mature males were also farther north near Bering Strait (station FF-01) (Figs. 101a and 101b).

The biomass estimate of mature female blue king crab was 474 ± 361 t, while the biomass estimate of immature females was 51 ± 55 t (Tables 31 and 32). The majority of mature and immature females were distributed off the northern coast of St. Lawrence Island at station BB-20 (Figs. 102a and 102b).

All male and 76% of female blue king crab caught in the NBS area were in new hardshell condition, with the remaining females being in oldshell condition (Figs. 104 and 105). Of the mature females, 76% were barren, while those with clutches all had uneyed eggs (Fig. 105).

Northern Bering Sea Tanner Crab

No Tanner crab (*Chionoecetes bairdi*) were caught in the northern Bering Sea in 2019.

Northern Bering Sea Snow Crab

Snow crab (*Chionoecetes opilio*) were caught at 99 of the 144 northern Bering Sea stations (Fig. 109). Because overall colder conditions reduce size-at-maturity for northern Bering Sea crab relative to eastern Bering Sea stocks, it is not viable to apply eastern Bering Sea metrics. Rather, it is necessary to determine a northern Bering Sea specific metric. An initial analysis of chela height/carapace width data using a mixture of regressions approach has indicated a point estimate for carapace width at 50% male morphometric maturity of 68 mm, 27 mm smaller than the established corresponding metric for eastern Bering Sea snow crab (Lang et al. 2018). Consistent with procedures historically used for the eastern Bering Sea snow crab stock, this size at maturity has been applied here as a cutline: crab ≥ 68 mm CW are classified as being mature, while crab < 68 mm CW are classified as being immature (Tables 33 and 35). As an update to this established metric, male size at maturity was reassessed in 2019 using chela height and carapace width, but applying the newly developed distribution-based procedure (see eastern Bering Sea section for methods; Fig. 114, Tables 33 and 35). For these analyses, in line with current procedures for estimates based on chela height maturity for the eastern Bering Sea stock, size at maturity was calculated separately for each year instead of being fixed at one constant value, and abundance/biomass estimates were calculated via a model applying a maturity curve to size frequency data rather than a fixed cutline. Estimates derived using this procedure are only reported in table form under the heading "mature male distribution method" (Tables 33 and 35).

The majority of legal-sized and mature male snow crab in the northern Bering Sea were caught at stations near the western border between the EBS and NBS surveys (Figs. 106 and 107). In 2019, the density of legal-sized male crab caught at a station ranged from 82 to 41,139 crab nmi^{-2} (see Appendix B), with a total biomass estimate (± 95% CI) of 16,503 ± 13,241 t and a total abundance estimate (± 95% CI) of 66.0 ± 50.4 million crab (compared with 74.6 ± 77.9 t and 0.2 ± 0.2 million crab in 2017; Tables 33 and 35).

The estimated biomass of mature snow crab was 37,018 ± 22,239 t, with a total abundance estimate of 200.9 ± 113.1 million crab (Tables 33 and 35). Immature male snow crab in the northern Bering Sea were most abundant at the southwestern edge of the survey grid and north of St. Lawrence Island (Figs. 107a and 107b), with a biomass estimate of 100,967 ± 43,892 t and a total abundance estimate of 2,212 ± 768 million crab (Tables 33 and 35).

The biomass estimate of mature female snow crab was 8,504 ± 4,781 t, while the biomass estimate of immature females was 20,635 ± 7,390 t (Tables 34 and 36). Female crab in the

northern Bering Sea were most abundant along the southern border, north of Saint Matthew Island. Immature females were also abundant north of St. Lawrence Island (Figs. 108a and 108b).

For male and female snow crab caught in the northern Bering Sea, 98% and 99% were new hardshell, respectively (Figs. 110 and 111). Eighty-three percent of females were immature. All gravid females had uneyed eggs, and 86% of mature females had clutches that were full or three-quarters full (Fig. 111).

Northern Bering Sea *Chionoecetes* spp. hybrid

No *Chionoecetes* spp. hybrid crab were caught in the northern Bering Sea in 2019.

Northern Bering Sea Hair Crab

Hair crab (*Erimacrus isenbeckii*) were caught at 7 of the 144 northern Bering Sea stations in 2019, all south of St. Lawrence Island (Figs. 112 and 113). A total of 25 hair crab were caught; 8 sub-legal males, 10 legal males and 7 females. The biomass estimate for sub-legal males (< 83 mm CL) was 58 ± 60 t while the biomass estimate legal-sized males was 197 ± 200 t. The biomass estimate for all females was 38 ± 44 t. The majority of both male and females were new hardshell.

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Table 1. -- Definition of carapace size classes for crab species caught in National Marine Fisheries Service's eastern Bering Sea standard survey. Carapace length (CL) is measured for *Paralithodes* spp. and *Erimacrus isenbeckii*, while carapace width (CW excluding spines) is measured for *Chionoecetes* species. **We define female maturity based on abdominal flap morphology and egg presence throughout this document.** The legal size classes defined by ADF&G (CW in inches) include spines.

Species	District	Sex	Immature	Mature	Pre-recruit	Legal Male
Paralithodes camtschaticus	Bristol Bay	male	< 120 mm	≥ 120 mm	110-134 mm	≥ 135 mm CL or ≥ 6.5 in. CW
	Pribilof	male	< 120 mm	≥ 120 mm	120-134 mm	≥ 135 mm CL or ≥ 6.5 in. CW
	Norton Sound	male	< 94 mm	≥ 94 mm	90-120 mm	≥ 104 mm CL or ≥ 4.8 in. CW
Paralithodes platypus	Pribilof	male	< 120 mm	≥ 120 mm	120-134 mm	≥ 135 mm CL or ≥ 6.5 in. CW
	St. Matthew	male	< 105 mm	≥ 105 mm	105-119 mm	≥ 120 mm CL or ≥ 5.5 in. CW
	Northern Bering Sea	male	<105 mm	≥ 105 mm	105-119 mm	≥ 120 mm CL or ≥ 5.5 in. CW
Chionoecetes bairdi	East of 166° W	male	< 113 mm	≥ 113 mm	113-124 mm	≥ 120 mm or ≥ 4.8 in. CW[1]
	West of 166° W	male	< 103 mm	≥ 103 mm	103-124 mm	≥ 110 mm or ≥ 4.4 in. CW[1]
	Preferred	male				≥ 125 mm or ≥ 4.9 in. CW
Chionoecetes opilio	Eastern Bering Sea	male	< 95 mm	≥ 95 mm	95-101 mm	≥ 78 mm or ≥ 3.1 in. CW[2]
	EBS Preferred	male				≥ 102 mm or ≥ 4.0 in. CW
	Northern Bering Sea	male	< 68 mm	≥ 68 mm	78-101 mm	≥ 78 mm or ≥ 3.1 in. CW
	NBS Preferred	male				≥ 102 mm or ≥ 4.0 in. CW
Erimacrus isenbeckii		male				≥ 83 mm CL or > 3.25 in. CW[3]

[1] The legal minimum size limit for *C. bairdi* is ≥ 4.8 inches CW (120 mm excluding spines; 122 mm including spines) east of 166° W and ≥ 4.4 inches CW (110 mm excluding spines; 112 including spines) west of 166° W (ADF&G reg. **5 AAC 35.520(b)(1)**).

[2] The legal minimum size limit for *C. opilio* is 3.1 inches CW (78 mm excluding spines; 79 mm including spines).

[3] Legal-sized male crab for *E. isenbeckii* are larger than a minimum size of 3.25 inches CW (≥ 83 mm CL) defined by Alaska Department of Fish and Game permit guidelines.

Table 2. -- History of methods for determining trawl on bottom and estimating net width on National Marine Fisheries Service eastern Bering Sea bottom trawls.

Year	Net width (m)	Trawling methodology
1975		First and only year tow duration = 1 hour
1976 - 2012		Tow duration = 30 minutes
1975 - 1995		Brake set and haul back of winch drum wire defined trawl contact with seafloor (net on bottom)
1996 - 2012		Began using bottom contact sensors to determine trawl contact with seafloor
1975 - 1980	12.2	Mean width of 400-mesh Eastern trawl*
1981	18.0	Mean width* of 83-112 Eastern trawl for Vessel 1
1981	13.4 or 14.3	Mean width* of 400-mesh Eastern trawl measurements different on haul 1-112 and 114-156 for Vessel 37*
1982 - 1987	Variable with each tow	Rose and Walters (1990) calculated the 83-112 net width based on an inverse relationship to net scope
1988 - 2001	Variable with each tow	All survey vessels used ScanMar acoustic sensors on the 83-112 trawl net
2001 - 2012	Variable with each tow	All survey vessels used NetMind acoustic sensors on the 83-112 trawl net
2013 - 2019	Variable with each tow	All survey vessels used Marport acoustic sensors on the 83-112 trawl net

*Single value used for net width when calculating area-swept.

Table 3. -- Weight-size regression relationships used to calculate biomass of crab species caught in National Marine Fisheries Service eastern Bering Sea bottom trawl surveys.

Stock	Sex	*a*	*b*
Bristol Bay	males	0.000403	3.141334
red king crab	females	n/a	n/a
	non-ovigerous females	0.000408	3.127956
	ovigerous females	0.003593	2.666076
Pribilof Islands	males	0.000403	3.141334
red king crab	females	n/a	n/a
	non-ovigerous females	0.000408	3.127956
	ovigerous females	0.003593	2.666076
Pribilof Islands	males	0.000508	3.106409
blue king crab	females	0.02065	2.27
	non-ovigerous females	n/a	n/a
	ovigerous females	n/a	n/a
St. Matthew	males	0.000502	3.107158
blue king crab	females	0.02065	2.27
	non-ovigerous females	n/a	n/a
	ovigerous females	n/a	n/a
Tanner crab	males	0.00027	3.022134
	females	n/a	n/a
	non-ovigerous females	0.000562	2.816928
	ovigerous females	0.000441	2.898686
Snow crab	males	0.000267	3.097253
	females	n/a	n/a
	non-ovigerous females	0.001047	2.708367
	ovigerous females	0.001158	2.708793
Hair crab	males	0.00071731	3.02
	females	0.00119453	2.86

Table 4. -- Special projects related to crab species conducted on National Marine Fisheries Service eastern Bering Sea bottom trawl survey in 2019.

Project Title	Principle Investigator	Agency
Bitter crab syndrome	Pam Jensen	RACE[1]-SAP[2]
Gene expression in Tanner crab	Pam Jensen	RACE[1]-SAP[2]
Annual vs. biennial snow crab reproductive cycle	Jennifer Newby	RACE[1]-SAP[2]
Shell structure of Tanner and snow crab	Chris Long/ Robert Foy	RACE[1]-SAP[2]
Snow crab condition	Erin Fedewa	RACE[1]-SAP[2]
Growth & hatching of Tanner and snow crab	Louise Copeman	RACE[1]-FBE[3]
Observer training collections	Duane Stevenson	FMA[4]
Population genomic structure of EBS Tanner crab	Tyler Jackson	ADF&G[5]
Black eye pathology	Tyler Jackson	ADF&G[5]

[1] Alaska Fisheries Science Center (AFSC), Resource Assessment and Conservation Engineering Division, Seattle, Washington.

[2] AFSC, Resource Assessment and Conservation Engineering Division, Shellfish Assessment Program, Kodiak, Alaska.

[3] AFSC, Resource Assessment and Conservation Engineering Division, Fisheries Behavioral Ecology Program, Newport, Oregon.

[4] AFSC, Fisheries Monitoring and Analysis Division, Seattle, Washington.

[5] State of Alaska, Department of Fish and Game, Kodiak, Alaska.

Table 5. -- Summary of 2019 National Marine Fisheries Service eastern Bering Sea bottom trawl survey details for seven commercial crab stocks. Male size categories are defined in Table 1.

		Tows in district	Tows with crab	Crab measured	Crab caught	Biomass (t)	CI (± 95%)
Bristol Bay District	Immature male	136	34	121	121	2,793	1,194
Red King Crab	Mature male	136	53	164	164	12,431	3,959
	Legal	136	42	94	94	8,965	3,109
	Immature female	136	22	39	39	351	186
	Mature female	136	51	274	274	13,088	4,757
Pribilof District	Immature male	77	3	13	13	293	363
Red King Crab	Mature male	77	12	46	46	2,086	1,406
	Legal	77	8	15	15	1,101	895
	Immature female	77	1	1	1	13	26
	Mature female	77	10	31	31	797	624
Pribilof District	Immature male	86	5	8	8	114	121
Blue King Crab	Mature male	86	3	3	3	204	241
	Legal	86	3	3	3	204	241
	Immature female	86	0	0	0	0	0
	Mature female	86	2	11	11	407	685
St. Matthew Is.	Immature male	56	8	100	100	765	831
Blue King Crab	Mature male	56	10	83	83	2,879	1,892
	Legal	56	10	59	59	2,304	1,483
	Immature female	56	5	81	81	525	670
	Mature female	56	7	40	40	389	481
Tanner Crab	Immature male	120	63	992	1,301	4,414	3,692
east of 166° W	Mature male	120	61	318	318	6,377	2,347
	Legal	120	56	256	256	5,521	2,138
	Preferred	120	49	209	209	4,769	1,939
	Immature female	120	49	734	1,059	1,481	956
	Mature female	120	23	132	132	652	437
Tanner Crab	Immature male	255	157	4,086	5,744	7,691	1,776
west of 166° W	Mature male	255	93	732	753	9,813	2,616
	Legal	255	87	617	627	8,749	2,452
	Preferred	255	59	306	306	5,001	1,563
	Immature female	255	132	3,254	5,736	3,339	1,212
	Mature female	255	83	1,058	1,325	4,113	1,984
Snow Crab	Immature male	375	229	10,546	76,872	284,181	95,099
	Mature male	375	180	2,146	4,775	54,550	19,151
	Legal	375	233	6,165	23,907	175,907	59,240
	Preferred	375	140	1,131	2,146	28,955	10,145
	Immature female	375	83	487	3,848	5,125	4,349
	Mature female	375	122	3,820	75,800	106,799	41,236

Table 6. -- Time series of biomass estimates (t) for Bristol Bay District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1977 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1978	54,371	146,682	66,417	98,241	3,795	141,265	54,370
1979	16,886	86,906	43,304	63,107	5,132	59,165	21,521
1980	37,369	129,829	65,411	106,655	7,594	73,712	46,197
1981	27,294	41,520	12,659	27,368	4,215	59,099	30,597
1982	51,268	23,038	8,656	10,184	21,932	48,913	18,738
1983	25,675	9,796	2,494	2,867	7,257	7,237	2,683
1984	79,710	16,849	8,751	7,623	38,806	17,529	14,374
1985	12,823	14,006	4,130	5,356	1,602	5,723	2,805
1986	12,382	28,189	27,164	13,033	1,847	5,062	2,860
1987	16,626	30,197	14,575	18,167	7,074	15,427	9,677
1988	9,513	25,861	9,178	19,117	1,205	18,019	14,900
1989	7,059	35,503	15,936	27,552	1,322	11,615	7,455
1990	6,344	32,481	14,786	24,527	2,871	17,995	14,579
1991	6,395	60,142	69,981	52,119	1,826	15,553	13,342
1992	6,787	18,327	6,835	13,747	1,088	11,163	5,657
1993	6,939	28,740	12,766	19,839	1,170	16,101	7,849
1994	3,601	19,775	6,740	13,371	1,104	8,283	3,558
1995	6,359	20,939	14,711	15,570	2,992	7,868	3,839
1996	9,067	18,111	7,309	15,073	5,380	12,042	6,829
1997	27,126	32,533	13,321	27,403	3,051	21,365	14,033
1998	13,035	33,297	10,450	19,409	2,161	35,849	17,889
1999	5,093	39,870	16,942	30,005	1,163	19,126	13,276
2000	6,961	31,450	10,638	22,090	2,615	26,387	18,086
2001	8,942	19,060	5,746	15,360	1,692	22,866	13,703
2002	12,113	33,359	12,655	25,241	5,150	19,144	10,306
2003	11,514	63,271	57,913	51,115	5,642	35,587	16,085
2004	27,917	63,159	54,053	53,895	6,162	34,826	18,589
2005	17,036	38,105	14,021	28,373	8,455	42,715	17,805
2006	11,756	39,808	17,766	32,148	6,521	37,005	14,306
2007	14,043	44,115	17,880	34,226	2,257	42,931	19,123
2008	15,840	51,375	35,542	38,155	1,675	44,194	28,234
2009	8,926	34,250	25,727	21,996	760	46,616	30,241
2010	5,441	33,586	16,497	24,891	535	40,951	21,869
2011	7,952	21,990	9,231	16,622	3,515	38,035	19,244
2012	5,841	24,837	13,411	19,858	2,881	27,282	17,713
2013	5,515	34,141	14,164	28,358	547	22,031	15,783
2014	12,621	48,038	17,559	36,130	1,560	50,926	22,953
2015	4,984	32,121	11,019	27,209	838	26,296	15,078
2016	2,077	25,481	7,302	22,424	772	33,370	17,051
2017	2,239	23,102	8,328	20,842	1,193	26,424	13,139
2018	2,818	13,226	3,589	12,010	520	12,282	5,437
2019	2,793	12,431	3,959	8,965	351	13,088	4,757

Table 7. -- Time series of abundance estimates (in millions) for Bristol Bay District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1977 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1978	89.5	67.9	30.7	38.5	27.8	161.3	61.9
1979	33.4	38.0	19.1	23.6	22.1	57.9	20.3
1980	70.8	51.3	25.3	37.5	34.4	87.9	66.4
1981	41.1	18.4	5.4	9.7	13.1	58.4	29.6
1982	110.9	12.0	4.9	4.0	72.4	52.9	21.8
1983	46.2	5.7	1.5	1.3	23.8	8.7	3.6
1984	164.9	9.1	4.7	3.3	109.8	27.4	23.9
1985	16.8	7.6	2.2	2.3	4.3	8.4	4.1
1986	15.2	14.8	14.6	5.6	5.2	6.4	3.6
1987	24.4	14.6	7.0	7.3	17.4	18.5	11.4
1988	11.3	11.6	4. 0	7.5	2.5	20.1	17.0
1989	10.0	15.1	6.5	10.4	3.9	13.2	8.6
1990	9.7	13.7	6.1	8.9	7.8	17.0	13.8
1991	9.7	23.2	26.1	18.5	4.8	14.9	13.8
1992	8.3	7.5	3.0	4.6	2.3	10.2	4.9
1993	8.2	12.5	5.6	7.0	2.8	14.0	7.0
1994	7.1	8.6	2.9	4.8	3.8	6.1	2.5
1995	11.0	9.1	6.9	5.9	6.1	6.3	3.0
1996	17.5	7.2	2.8	5.3	14.3	9.8	5.6
1997	32.6	12.3	4.8	9.2	5.1	21.8	17.1
1998	16.8	15.4	5.0	6.8	6.3	31.7	17.5
1999	11.3	17.4	7.7	11.7	4.1	15.4	10.8
2000	10.7	14.0	4.9	8.4	6.3	21.0	13.6
2001	12.0	7.4	2.2	5.1	4.3	20.9	12.9
2002	22.9	13.6	5.2	8.6	17.6	17.0	9.7
2003	18.8	24.4	19.4	17.1	13.2	28.3	13.2
2004	43.3	23.7	19.8	18.0	19.7	31.7	18.9
2005	31.5	15.6	5.4	9.6	23.6	35.6	15.3
2006	21.2	16.4	7.2	11.8	16.9	31.0	12.2
2007	17.5	18.2	7.1	12.3	4.5	35.8	16.3
2008	17.1	20.9	13.8	12.9	3.7	36.8	24.3
2009	9.6	15.6	11.5	8.3	1.7	35.8	22.4
2010	6.5	14.7	7.0	9.4	1.2	31.5	17.4
2011	37.5	9.3	3.9	6.1	33.0	29.3	15.1
2012	8.0	9.7	4.9	6.7	7.6	19.6	13.2
2013	6.7	12.9	5.3	9.4	1.3	15.6	11.1
2014	15.5	19.7	7.3	12.4	2.8	36.9	17.0
2015	6.7	11.6	4.0	8.7	2.4	18.4	10.6
2016	4.7	9.0	2.6	7.1	3.6	22.4	11.6
2017	3.3	7.7	2.7	6.4	2.5	17.5	8.6
2018	3.8	4.6	1.2	3.8	1.4	9.0	4.0
2019	3.7	5.0	1.6	2.9	1.2	8.4	3.1

Table 8. -- Average bottom water temperatures collected at stations with mature female Bristol Bay red king crab (*Paralithodes camtschaticus*) on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey, and the mean ratio of a combination of eyed, hatching, and freshly hatched eggs to uneyed embryos in mature red king crab females. Bristol Bay stations were sampled twice during the cold years (highlighted in gray). An * indicates statistical significance within the year using a two sample t-test, alpha = 0.95 and P < 0.001.

Sample event	Average bottom temperature (°C)	Standard deviation (n = stations)	Two sample t-test values	Mean eyed to uneyed embryo ratio
May 1999	0.1	0.8 (41)	t = -11.9	6.68
July 1999	2.5*	0.8 (31)		0.03
May 2000	1.7	0.5 (49)	t = -9.2	1.54
July 2000	4.6*	1.6 (23)		0.01
June 2001	3.5	0.3 (40)		0.01
June 2002	3.4	0.6 (52)		0.06
June 2003	4.2	0.4 (51)		0.01
June 2004	3.9	0.5 (61)		0.03
June 2005	4.3	0.5 (49)		0.01
June 2006	2.2	0.7 (69)	t = -12.5	0.63
July 2006	4.2*	0.8 (30)		0.01
June 2007	1.8	0.9 (68)	t = -7.4	1.05
July 2007	3.4*	1.0 (32)		0.01
June 2008	1.4	0.7 (76)	t = -9.5	2.41
July 2008	3.6*	1.1 (32)		0.01
June 2009	1.5	1.6 (73)	t = -8.6	0.93
July 2009	4.5*	1.5 (32)		0.01
June 2010	2	0.9 (40)	t = -10.9	0.64
July 2010	4.8*	1.0 (23)		0.00
June 2011	2.9	0.8 (46)	t = -8.6	0.94
July 2011	5.9*	1.1 (20)		0.06
June 2012	0.9	1.2 (40)	t = -8.4	1.89
July 2012	4.0*	1.3 (15)		0.00
June 2013	2.9	1.1 (35)		0.02
June 2014	4.4	0.8 (40)		0.00
June 2015	4.6	0.4 (44)		0.00
June 2016	5.7	0.7 (57)		0.00
June 2017	3.18	1.02 (51)	t = -4.9	1.19
August 2017	5.01*	1.54 (20)		0.00
June 2018	4.6	0.39 (41)		0.00
June 2019	5.2	0.87 (51)		0.00

Table 9. -- Time series of biomass estimates (t) for Pribilof District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1977 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1978	0	1,250	2,022	1,250	0	52	102
1979	0	556	561	488	0	93	182
1980	18	1,269	950	1,269	0	262	374
1981	0	312	358	312	0	35	68
1982	18	1,464	2,002	1,464	14	919	1,402
1983	26	527	551	493	0	309	292
1984	0	317	341	283	0	112	125
1985	0	61	121	61	0	0	0
1986	0	138	188	138	0	79	154
1987	0	54	105	54	31	0	0
1988	713	107	209	44	283	553	940
1989	675	1,529	2,728	871	924	1,327	2,140
1990	7,477	1, 141	2,077	138	522	2,200	3,048
1991	640	4,430	6,913	1,321	66	4,967	5,864
1992	274	3,305	3,864	2,528	278	3,153	5,620
1993	282	9,873	17,834	9,189	7	6,471	9,096
1994	430	9,139	13,748	8,117	47	3,917	6,772
1995	431	18,056	21,267	16,793	315	4,834	6,393
1996	68	2,361	1,720	2,330	31	1,976	2,867
1997	1,510	6,159	7,515	5,940	218	1,744	2,018
1998	416	2,324	1,639	1,778	50	1,669	2,487
1999	3,358	5,523	7,217	4,472	4,117	1,302	1,826
2000	157	4,320	3,164	3,843	8	987	1,214
2001	2,339	8,603	13,262	5,770	406	5,369	10,462
2002	8	7,037	9,461	7,014	12	775	803
2003	0	5,373	6,928	5,275	1	2,268	4,032
2004	152	3,622	4,183	3,622	105	1,187	1,238
2005	55	1,238	1,420	1,238	0	3,118	4,791
2006	109	7,003	5,252	6,696	10	2,173	2,627
2007	214	5,224	5,042	5,007	50	1,760	2,647
2008	332	5,462	5,418	5,102	192	2,825	3,701
2009	44	2,500	3,125	2,127	15	811	841
2010	53	4,405	3,767	3,973	0	840	1,167
2011	44	3,834	4,872	3,751	3	814	1,165
2012	336	4,477	5,031	4,360	0	663	710
2013	104	7,749	9,409	7,567	0	169	194
2014	82	12,047	18,525	11,433	0	1,093	2,015
2015	113	15,173	21,971	14,788	0	3,859	7,270
2016	526	4,150	5,700	3,653	26	1,873	2,241
2017	88	3,658	4,632	3,513	0	505	550
2018	1,325	929	775	827	0	877	1,500
2019	293	2,086	1,406	1,101	13	797	624

Table 10. -- Time series of abundance estimates (in millions) for Pribilof District red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1979	0.0	0.2	0.2	0.2	0.0	0.1	0.1
1980	0.1	0.4	0.3	0.4	0.0	0.1	0.2
1981	0.0	0.1	0.1	0.1	0.0	0.0	0.0
1982	0.0	0.3	0.4	0.3	0.0	0.5	0.7
1983	0.0	0.1	0.1	0.1	0.0	0.2	0.1
1984	0.0	0.1	0.1	0.1	0.0	0.1	0.1
1985	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1986	0.0	0.0	0.1	0.0	0.0	0.0	0.1
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1988	1.9	0.1	0.1	0.0	1.6	0.4	0.7
1989	1.1	0.8	1.4	0.4	1.8	1.1	1.7
1990	7.1	0.8	1.4	0.1	0.7	2.3	3.0
1991	0.7	2.4	3.8	0.6	0.3	4.3	5.1
1992	0.4	1.5	1.8	1.0	0.4	2.4	4.4
1993	0.3	3.5	6.4	3.1	0.0	4.5	6.4
1994	0.4	3.1	4.7	2.4	0.1	2.4	4.2
1995	0.5	5.2	5.9	4.4	0.3	3.0	3.9
1996	0.1	0.6	0.4	0.5	0.0	1.1	1.6
1997	1.6	1.6	1.7	1.4	0.3	1.0	1.1
1998	0.4	0.8	0.6	0.4	0.1	1.0	1.4
1999	7.2	1.9	2.2	1.3	9.5	0.9	1.1
2000	0.1	1.5	1.2	1.3	0.0	0.7	0.8
2001	2.5	3.7	6.1	1.9	0.6	3.8	7.5
2002	0.0	1.9	2.5	1.9	0.0	0.4	0.4
2003	0.0	1.5	2.0	1.4	0.0	1.2	2.1
2004	1.4	0.8	0.9	0.8	1.1	0.5	0.6
2005	0.1	0.2	0.3	0.2	0.0	1.3	2.0
2006	0.1	1.4	1.1	1.2	0.0	1.0	1.1
2007	0.2	1.2	1.3	1.1	0.1	0.8	1.3
2008	0.4	1.3	1.2	1.1	0.2	1.5	2.1
2009	0.0	0.9	1.2	0.7	0.0	0.3	0.3
2010	0.1	1.4	1.3	1.2	0.0	0.6	0.8
2011	0.0	1.0	1.3	1.0	0.0	0.5	0.6
2012	0.4	1.2	1.5	1.2	0.0	0.4	0.5
2013	0.1	1.7	2.0	1.6	0.0	0.1	0.1
2014	0.1	3.0	4.2	2.6	0.0	0.5	0.9
2015	0.1	3.5	4.9	3.3	0.0	1.8	3.3
2016	0.5	1.3	1.9	1.0	0.04	1.3	1.4
2017	0.1	1.0	1.3	1.0	0.0	0.3	0.3
2018	1.5	0.3	0.2	0.2	0.0	0.9	1.7
2019	0.2	0.9	0.6	0.3	0.02	0.6	0.5

Table 11. -- Time series of biomass estimates (t) for blue king crab (*Paralithodes platypus*) by size category (CL) and sex in the Pribilof District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1979	61	10,959	6,775	9,040	92	1,097	1,706
1980	2,084	23,553	19,846	20,679	699	211,604	408,004
1981	1,704	11,628	3,963	10,554	497	5,987	5,507
1982	1,152	7,389	2,712	6,893	553	8,824	11,724
1983	962	5,409	1,882	4,474	258	9,990	15,495
1984	130	2,216	993	1,824	15	3,070	2,292
1985	39	1,055	551	755	5	520	457
1986	4	1,505	893	1,473	11	2,420	4,272
1987	191	2,923	2,357	2,781	119	795	909
1988	170	842	873	842	190	528	508
1989	1,275	827	1,034	827	801	945	1,075
1990	2,004	3,078	3,617	1,514	1,118	1,810	1,803
1991	1,377	4,690	3,544	3,326	343	2,433	1,973
1992	1,801	4,391	3,637	3,035	802	1,848	1,737
1993	1,088	4,556	2,743	3,203	444	1,647	1,489
1994	619	3,410	2,305	2,806	87	4,806	4,207
1995	968	8,360	9,898	6,787	331	3,948	4,017
1996	745	4,641	2,444	3,873	177	5,408	5,318
1997	381	3,233	1,749	2,765	194	2,835	2,386
1998	692	2,798	1,367	2,510	267	1,914	1,654
1999	161	1,729	1,141	1,426	0	2,868	2,625
2000	113	2,091	1,212	1,746	0	1,462	1,319
2001	87	1,599	2,302	1,461	0	1,816	2,571
2002	0	680	674	647	0	1,401	2,129
2003	19	702	550	671	21	1,286	1,880
2004	36	107	122	48	25	98	114
2005	326	344	479	344	477	370	413
2006	87	166	196	139	38	538	801
2007	197	306	479	206	59	223	384
2008	212	46	90	46	222	450	560
2009	254	497	695	187	80	545	907
2010	92	303	274	190	84	310	401
2011	0	461	763	399	3	34	49
2012	165	644	928	459	9	229	296
2013	15	250	391	190	12	154	211
2014	83	233	320	233	16	91	108
2015	82	622	480	428	0	160	207
2016	70	129	154	68	49	352	340
2017	45	253	254	223	55	204	237
2018	94	152	170	152	13	108	154
2019	114	204	241	204	0	407	685

Table 12. -- Time series of abundance estimates (in millions) by size category (CL) and sex for blue king crab (*Paralithodes platypus*) in the Pribilof District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 120 mm	Mature male ≥ 120 mm	Mature male ± CI	Legal male ≥ 135 mm	Immature female	Mature female	Mature female ± CI
1979	0.1	4.1	2.6	3.0	0.1	1.2	1.9
1980	2.7	7.8	6.3	6.2	0.8	182.9	350.4
1981	2.1	3.8	1.3	3.2	0.8	5.4	4.7
1982	1.4	2.4	0.8	2.1	0.9	7.8	10.0
1983	1.0	1.9	0.7	1.3	0.5	9.3	14.2
1984	0.5	0.8	0.3	0.6	0.5	2.8	2.1
1985	0.1	0.4	0.2	0.3	0.3	0.5	0.4
1986	0.0	0.5	0.3	0.5	0.0	2.1	3.7
1987	0.6	0.9	0.7	0.8	0.4	0.7	0.8
1988	1.2	0.2	0.2	0.2	0.9	0.5	0.4
1989	3.5	0.2	0.3	0.2	2.6	1.1	1.5
1990	2.4	1.5	1.8	0.6	2.2	2.0	2.2
1991	1.9	2.0	1.4	1.2	0.8	2.8	2.3
1992	2.4	1.9	1.6	1.2	1.8	2.1	2.1
1993	1.5	1.9	1.1	1.1	0.9	1.8	1.6
1994	0.6	1.3	0.9	0.9	0.1	5.0	4.4
1995	1.1	3.1	3.6	2.2	0.7	4.0	4.1
1996	0.7	1.7	0.9	1.3	0.3	5.0	4.8
1997	0.5	1.2	0.7	0.9	0.3	2.6	2.2
1998	0.9	1.0	0.5	0.8	0.5	1.8	1.6
1999	0.2	0.6	0.4	0.5	0.0	2.8	2.6
2000	0.2	0.7	0.4	0.5	0.0	1.4	1.2
2001	0.1	0.5	0.7	0.4	0.0	1.7	2.5
2002	0.0	0.2	0.2	0.2	0.0	1.2	1.9
2003	0.0	0.2	0.2	0.2	0.1	1.1	1.7
2004	0.1	0.0	0.1	0.0	0.1	0.1	0.1
2005	2.0	0.1	0.1	0.1	2.3	0.3	0.3
2006	0.1	0.1	0.1	0.0	0.1	0.4	0.6
2007	0.2	0.1	0.2	0.1	0.1	0.2	0.3
2008	0.2	0.0	0.0	0.0	0.3	0.4	0.6
2009	0.3	0.2	0.4	0.1	0.2	0.5	0.8
2010	0.1	0.1	0.1	0.1	0.2	0.2	0.3
2011	0.0	0.2	0.3	0.1	0.0	0.0	0.0
2012	0.2	0.3	0.4	0.2	0.0	0.3	0.5
2013	0.1	0.1	0.2	0.1	0.0	0.2	0.2
2014	0.1	0.1	0.1	0.1	0.0	0.1	0.1
2015	0.1	0.2	0.2	0.1	0.0	0.2	0.3
2016	0.1	0.1	0.1	0.02	0.1	0.4	0.4
2017	0.1	0.1	0.1	0.1	0.1	0.2	0.3
2018	0.1	0.1	0.1	0.1	0.02	0.1	0.1
2019	0.2	0.1	0.1	0.1	0.0	0.3	0.5

Table 13. -- Time series of biomass estimates (t) for blue king crab (*Paralithodes platypus*) by size category (CL) and sex in the St. Matthew Island Section sampling stratum of the Northern District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1978-1979 data.

Year	Immature male < 105 mm	Mature male ≥ 105 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
1980	2,646	7,826	7,151	4,786	423	737	1,248
1981	527	6,175	4,894	4,715	97	63	71
1982	1,758	14,934	9,259	12,065	416	0	0
1983	1,162	8,834	4,907	6,919	78	1,597	2,183
1984	539	3,737	1,358	3,145	42	216	285
1985	404	2,831	1,208	2,405	95	38	60
1986	252	1,267	971	725	99	13	25
1987	495	2,022	1,130	1,284	205	35	49
1988	702	2,830	1,346	1,880	612	123	147
1989	3,041	4,790	2,344	3,415	1,219	504	448
1990	1,122	5,931	3,073	4,707	336	13	25
1991	1,664	6,073	2,918	4,099	521	270	506
1992	1,250	6,279	2,513	4,608	280	216	250
1993	2,106	8,425	2,685	6,258	643	1,635	3,026
1994	916	5,812	2,008	4,246	99	128	131
1995	1,038	4,889	1,653	3,448	182	21	28
1996	1,291	8,494	4,013	6,218	364	432	770
1997	1,342	10,005	6,471	7,341	287	407	707
1998	902	7,478	5,269	5,487	210	243	261
1999	272	1,423	507	1,163	93	14	28
2000	315	1,880	1,136	1,534	52	37	52
2001	483	2,512	1,254	1,937	145	43	48
2002	119	1,640	1,033	1,371	1	89	120
2003	542	1,233	765	918	94	339	430
2004	443	1,341	754	1,139	194	66	82
2005	449	1,396	987	1,016	93	52	76
2006	1,050	3,223	2,262	2,460	145	14	28
2007	2,618	4,564	3,113	2,217	247	47	47
2008	1,972	3,655	2,059	2,701	214	40	45
2009	1,891	5,079	2,630	2,571	218	192	191
2010	3,974	8,141	5,955	4,317	112	456	856
2011	1,699	9,516	10,167	5,701	122	32	46
2012	907	5,652	3,668	3,313	52	74	64
2013	446	2,022	860	1,485	85	27	38
2014	796	5,472	4,750	3,568	40	62	75
2015	825	5,134	7,656	3,592	5	24	35
2016	509	3,072	2,273	2,305	0	129	104
2017	122	1,721	1,968	1,333	61	0	0
2018	434	1,612	879	1,358	312	316	267
2019	765	2,879	1,892	2,304	525	389	481

Table 14. -- Time series of abundance estimates (in millions) for blue king crab (*Paralithodes platypus*) by size category (CL) and sex in the St. Matthew Island Section sampling stratum of the Northern District from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1978-1979 data.

Year	Immature male < 105 mm	Mature male ≥ 105 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
1980	4.2	5.1	5.1	2.5	1.1	1.3	2.2
1981	0.9	3.5	2.5	2.3	0.2	0.1	0.1
1982	3.0	8.3	5.5	5.9	0.9	0.0	0.0
1983	2.0	5.0	2.9	3.3	0.4	2.6	3.5
1984	1.3	1.9	0.7	1.5	0.2	0.3	0.4
1985	0.7	1.5	0.7	1.1	0.3	0.1	0.1
1986	0.6	0.8	0.7	0.4	0.3	0.0	0.0
1987	1.0	1.3	0.8	0.7	0.6	0.1	0.1
1988	1.5	1.8	0.9	1.0	1.6	0.2	0.2
1989	6.2	2.9	1.5	1.8	3.2	1.0	0.8
1990	1.9	3.4	1.8	2.3	0.8	0.0	0.0
1991	3.3	3.9	1.9	2.2	1.4	0.4	0.8
1992	2.2	3.7	1.5	2.3	0.8	0.5	0.5
1993	4.2	5.1	1.7	3.3	1.7	2.3	4.3
1994	1.4	3.6	1.3	2.3	0.2	0.2	0.2
1995	1.7	2.9	1.0	1.7	0.6	0.0	0.1
1996	2.4	5.0	2.5	3.1	1.1	0.7	1.2
1997	2.3	6.0	4.2	3.8	0.8	0.6	1.1
1998	2.1	4.5	3.4	2.8	0.6	0.4	0.4
1999	0.5	0.8	0.3	0.6	0.3	0.0	0.0
2000	0.5	1.0	0.6	0.7	0.1	0.1	0.1
2001	0.8	1.4	0.7	0.9	0.4	0.1	0.1
2002	0.2	0.9	0.5	0.6	0.0	0.1	0.2
2003	1.2	0.7	0.5	0.5	0.3	0.6	0.7
2004	0.9	0.7	0.5	0.6	0.5	0.1	0.1
2005	0.9	0.8	0.6	0.5	0.3	0.1	0.1
2006	1.8	1.9	1.4	1.2	0.3	0.0	0.0
2007	4.5	3.2	2.3	1.2	0.8	0.1	0.1
2008	3.8	2.3	1.3	1.5	0.7	0.1	0.1
2009	3.4	3.6	2.0	1.4	0.6	0.4	0.4
2010	6.2	5.7	4.6	2.5	0.4	1.0	1.9
2011	2.6	6.5	7.2	3.2	0.4	0.1	0.1
2012	1.6	3.8	2.6	1.8	0.2	0.1	0.1
2013	0.8	1.3	0.5	0.8	0.3	0.1	0.1
2014	1.3	3.4	3.4	1.8	0.1	0.1	0.1
2015	1.2	3.2	4.8	2.0	0.0	0.1	0.1
2016	0.8	1.8	1.5	1.2	0.0	0.3	0.2
2017	0.2	1.0	1.2	0.7	0.1	0.0	0.0
2018	1.1	0.9	0.5	0.7	1.0	0.6	0.5
2019	1.9	1.7	1.1	1.2	1.5	0.8	1

Table 15. -- Time series of biomass estimates (t) for male Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, east of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 113 mm	Mature male ≥ 113 mm	Mature male ± CI	Mature male distribution method*^	Legal male ≥ 120 mm	Preferred male ≥ 125 mm
1979	2,278	15,700	5,632	n/a	14,652	13,192
1980	8,433	40,546	25,266	n/a	37,082	34,041
1981	4,668	18,722	8,004	n/a	16,324	14,731
1982	5,518	11,084	3,934	n/a	9,415	7,860
1983	3,289	10,047	4,708	n/a	8,572	7,233
1984	2,522	9,498	4,010	n/a	8,376	7,424
1985	1,735	6,495	3,007	n/a	5,971	5,101
1986	4,583	5,043	3,078	n/a	4,005	3,280
1987	17,778	11,085	4,604	n/a	9,840	8,385
1988	26,460	31,670	29,201	n/a	22,482	18,413
1989	27,575	60,142	20,624	n/a	49,413	41,104
1990	23,938	52,942	18,111	33,904	47,567	42,987
1991	25,932	63,893	40,349	30,285	54,968	47,449
1992	15,381	74,538	47,450	40,267	66,517	57,665
1993	8,056	45,337	17,552	21,007	40,826	34,932
1994	3,217	29,086	9,786	9,753	26,534	23,912
1995	1,985	17,687	8,332	698	16,321	14,757
1996	3,435	16,545	10,642	424	15,562	14,242
1997	3,301	5,787	2,014	828	5,026	4,561
1998	3,175	5,229	1,580	2,185	4,259	3,605
1999	8,470	6,365	3,007	3,217	4,498	3,483
2000	5,297	11,131	6,847	4,693	8,913	7,529
2001	5,780	10,451	4,498	4,474	9,036	8,073
2002	4,359	10,043	4,434	1,081	9,030	8,046
2003	6,281	10,883	4,939	2,652	9,175	7,991
2004	3,444	9,011	5,060	3,125	7,773	6,513
2005	5,325	12,118	5,182	4,897	10,289	8,190
2006	15,136	13,500	5,467	5,335	10,921	8,927
2007	12,137	15,802	8,749	8,066	11,884	9,457
2008	10,424	26,753	28,996	20,012	22,447	18,764
2009	3,849	10,937	5,728	n/a	8,947	7,783
2010	3,674	10,752	5,420	3,610	9,137	7,582
2011	11,865	11,525	6,302	n/a	9,814	8,500
2012	30,882	14,485	6,790	9,682	10,602	8,378
2013	25,423	39,157	25,944	n/a	23,823	14,397
2014	18,262	39,934	12,430	22,753	30,404	24,210
2015	7,853	27,241	6,936	n/a	22,853	19,301
2016	6,997	18,523	4,755	4,685	14,143	10,695
2017	4,565	19,387	6,292	1,802	15,675	12,470
2018	2,711	11,058	3,127	412	8,861	7,355
2019	4,414	6,377	2,347	792	5,521	4,769

***** Biomass denoted with "n/a" when chela height was not available for that year.

^ Values differ from 2018 Technical Memorandum due to adjustments to model (Lang et al. 2019).

Table 16. -- Time series of biomass estimates (t) for female Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, east of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature female	Mature female	Mature female ± CI
1979	591	2,858	2,042
1980	1,321	11,562	8,541
1981	893	7,684	4,249
1982	1,310	6,797	3,505
1983	913	4,438	2,368
1984	671	4,129	3,590
1985	324	2,836	2,350
1986	1,499	2,006	1,000
1987	11,912	3,097	1,426
1988	3,703	19,182	11,150
1989	6,666	12,309	4,797
1990	5,990	19,032	8,996
1991	3,633	27,708	17,830
1992	346	11,013	4,847
1993	153	5,171	2,167
1994	65	5,268	3,096
1995	250	5,732	3,442
1996	1,015	5,533	3,885
1997	967	1,947	857
1998	550	1,202	492
1999	1,089	2,272	1,486
2000	729	2,885	2,197
2001	2,617	1,314	618
2002	1,768	1,701	1,106
2003	705	2,090	940
2004	267	863	341
2005	1,673	2,820	2,022
2006	2,451	4,025	2,318
2007	696	5,916	4,373
2008	622	4,457	2,665
2009	533	4,021	3,045
2010	795	2,115	1,752
2011	4,390	2,225	1,174
2012	5,694	8,550	5,264
2013	2,344	11,054	7,122
2014	489	8,159	7,538
2015	628	4,675	3,126
2016	50	1,429	850
2017	158	1,986	769
2018	990	598	269
2019	1,481	652	437

Table 17. -- Time series of abundance estimates (in millions) for male Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, east of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 113 mm	Mature male ≥ 113 mm	Mature male ± CI	Mature male distribution method*^	Legal male ≥ 120 mm	Preferred male ≥ 125 mm
1979	12.7	20.1	7.0	n/a	17.8	15.2
1980	40.5	50.4	30.6	n/a	43.0	37.5
1981	29.2	26.2	11.3	n/a	21.0	18.1
1982	28.2	16.3	6.0	n/a	12.7	9.9
1983	38.6	15.2	7.1	n/a	12.1	9.6
1984	27.4	13.0	5.3	n/a	10.6	8.8
1985	12.0	8.5	3.7	n/a	7.4	5.8
1986	50.6	7.3	3.8	n/a	5.1	3.7
1987	136.0	15.7	5.9	n/a	13.0	10.3
1988	138.2	49.3	41.4	n/a	29.6	22.1
1989	243.7	89.5	30.2	n/a	66.4	51.1
1990	167.4	68.1	22.0	46.3	56.7	48.3
1991	123.4	90.2	61.3	38.4	71.3	57.5
1992	54.7	105.7	67.0	52.5	88.5	72.3
1993	30.0	63.8	25.1	25.7	54.2	43.5
1994	12.8	39.4	13.4	12.8	34.0	29.2
1995	10.6	24.0	11.0	1.1	21.2	18.3
1996	29.3	21.8	13.8	1.2	19.8	17.3
1997	36.5	7.9	2.6	1.5	6.3	5.4
1998	24.9	7.8	2.4	4.7	5.8	4.6
1999	50.1	10.1	4.8	6.6	6.1	4.3
2000	32.7	16.8	10.0	8.0	12.1	9.6
2001	118.0	14.5	5.6	5.9	11.5	9.8
2002	45.8	13.2	5.3	1.9	11.0	9.2
2003	41.8	14.9	5.8	4.8	11.2	9.1
2004	18.2	12.4	5.3	6.4	9.7	7.4
2005	41.9	17.5	6.4	10.2	13.5	9.7
2006	84.0	20.1	7.7	12.2	14.6	10.9
2007	52.2	24.7	13.0	17.7	16.2	11.8
2008	42.1	37.8	36.2	31.7	28.7	21.9
2009	32.8	16.1	8.1	n/a	11.8	9.7
2010	39.1	15.3	7.3	5.9	11.9	9.1
2011	135.2	16.0	7.5	n/a	12.4	10.0
2012	167.6	22.7	10.7	31.5	14.4	10.3
2013	110.0	69.6	49.7	n/a	37.0	19.6
2014	75.5	62.3	19.0	39.7	41.9	30.5
2015	40.2	40.0	9.4	n/a	30.7	24.1
2016	24.6	29.6	7.7	8.1	20.2	13.9
2017	20.6	29.8	9.5	2.9	21.8	15.9
2018	40.8	16.7	4.5	1.0	12.0	9.2
2019	37.6	9.3	3.3	1.9	7.5	6.1

* Abundance denoted with "n/a" when chela height was not available for that year.

^ Values differ from 2018 Technical Memorandum due to adjustments to model (Lang et al. 2019).

Table 18. -- Time series of abundance estimates (in millions) for female Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, east of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature female	Mature female	Mature female ± CI
1979	7.7	13.0	9.5
1980	15.6	50.5	37.7
1981	16.1	35.1	20.4
1982	14.7	31.2	16.6
1983	30.2	18.3	10.0
1984	19.5	16.3	13.1
1985	5.4	10.8	8.0
1986	37.5	8.7	3.9
1987	123.1	13.4	5.5
1988	56.3	84.4	47.9
1989	183.1	57.8	22.9
1990	98.7	101.5	47.2
1991	41.8	145.9	103.7
1992	5.1	53.9	23.2
1993	2.9	24.9	10.8
1994	2.7	27.0	17.2
1995	5.6	30.2	18.5
1996	18.1	28.9	20.4
1997	34.7	11.1	5.2
1998	13.4	6.7	2.9
1999	21.3	12.6	7.8
2000	16.6	15.0	11.2
2001	112.2	7.1	3.3
2002	36.4	10.8	7.9
2003	13.6	12.0	5.7
2004	8.6	4.5	2.1
2005	39.3	16.1	12.1
2006	29.1	21.9	12.0
2007	11.5	30.5	21.1
2008	8.9	24.6	15.2
2009	23.9	22.1	16.9
2010	29.7	10.6	8.4
2011	88.8	12.2	6.2
2012	65.8	52.4	35.7
2013	33.2	60.8	42.5
2014	15.1	44.7	42.0
2015	14.5	27.6	19.2
2016	1.4	7.7	4.7
2017	5.3	10.2	4.0
2018	35.0	3.5	1.6
2019	30.3	3.7	2.5

Table 19. -- Time series of biomass estimates (t) for male Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, west of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 103 mm	Mature male ≥ 103 mm	Mature male ± CI	Mature male distribution method*^	Legal male ≥ 110 mm	Preferred male ≥ 125 mm
1979	16,462	15,596	6,183	n/a	12,913	7,860
1980	64,467	39,038	17,099	n/a	27,984	12,887
1981	29,763	26,777	8,029	n/a	18,061	8,050
1982	14,735	34,520	12,749	n/a	25,512	11,622
1983	7,761	16,947	6,540	n/a	13,195	5,655
1984	5,865	12,625	4,735	n/a	10,016	3,730
1985	2,533	4,143	1,442	n/a	3,169	1,458
1986	6,228	5,758	4,123	n/a	3,286	816
1987	8,047	8,601	3,960	n/a	6,994	4,163
1988	19,282	21,812	12,530	n/a	17,868	10,618
1989	15,988	29,119	12,768	n/a	24,883	16,499
1990	16,029	39,509	22,820	33,305	35,175	24,356
1991	17,926	38,059	13,836	18,947	34,230	21,816
1992	11,419	26,255	11,787	7,482	23,410	16,311
1993	7,226	12,651	4,912	7,863	10,873	6,312
1994	5,070	10, 962	3,745	3,034	9,526	5,391
1995	3,553	11,757	6,911	1,373	10,592	5,761
1996	2,927	7,863	6,170	982	6,682	3,680
1997	1,986	3,575	1,185	777	2,873	1,121
1998	3,041	3,563	1,227	1,491	2,602	1,085
1999	4,409	2,311	961	1,543	1,679	612
2000	4,116	2,787	850	1,293	2,003	627
2001	8,171	4,918	2,069	2,198	3,943	1,780
2002	8,691	4,318	1,595	2,454	3,029	1,222
2003	12,528	8,133	3,789	3,569	6,424	2,661
2004	13,064	13,404	7,012	6,271	9,732	2,805
2005	18,964	27,348	10,511	17,881	23,655	13,839
2006	33,861	39,045	19,584	10,409	32,859	19,083
2007	35,745	40,540	25,656	11,183	31,673	16,281
2008	15,705	32,031	17,342	20,131	26,351	13,145
2009	9,673	22,980	9,143	n/a	19,770	10,812
2010	8,305	26,296	14,128	15,638	23,372	14,460
2011	13,198	26,123	17,353	n/a	23,259	15,660
2012	19,737	15,027	4,271	6,449	11,928	6,365
2013	18,417	20,423	9,311	n/a	15,939	8,220
2014	17,345	33,394	8,146	21,351	24,859	11,766
2015	8,036	31,122	9,281	n/a	27,067	14,306
2016	8,196	35,119	8,671	12,089	31,252	18,326
2017	5,417	24,268	7,812	2,625	21,288	12,553
2018	8,786	23,948	6,999	4,017	21,572	12,871
2019	7,691	9,813	2,616	2,420	8,749	5,001

***** Biomass denoted with "n/a" when chela height data were not available for that year.

^ Values differ from 2018 Technical Memorandum due to adjustments to model (Lang et al. 2019).

Table 20. -- Time series of biomass estimates (t) for female Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, west of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature female	Mature female	Mature female ± CI
1979	3,236	16,465	11,111
1980	12,199	52,221	33,389
1981	631	34,893	20,587
1982	410	57,347	32,263
1983	1,426	15,993	6,928
1984	1,573	10,785	5,490
1985	675	2,718	1,636
1986	1,210	1,360	831
1987	3,095	2,042	837
1988	6,484	6,184	3,169
1989	5,165	7,090	3,186
1990	3,869	18,663	17,538
1991	3,390	17,056	7,234
1992	1,644	15,213	6,889
1993	913	6,470	2,484
1994	1,137	4,579	2,492
1995	808	6,667	4,052
1996	424	4,047	3,539
1997	442	1,451	884
1998	1,413	1,076	505
1999	1,793	1,554	635
2000	1,753	1,246	622
2001	3,741	3,247	1,915
2002	3,733	2,766	1,375
2003	3,984	6,313	3,007
2004	3,866	3,865	1,569
2005	8,710	8,759	3,745
2006	10,808	10,914	4,484
2007	4,944	7,521	2,312
2008	2,238	7,206	3,191
2009	2,039	4,456	1,569
2010	3,008	3,358	1,567
2011	6,001	3,189	983
2012	5,982	3,805	1,338
2013	4,071	6,795	2,393
2014	2,023	6,705	3,547
2015	1,038	6,536	4,526
2016	1,057	6,076	3,664
2017	1,255	5,019	3,069
2018	3,921	4,293	1,926
2019	3,339	4,113	1,984

Table 21. -- Time series of abundance estimates (in millions) for male Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, west of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature male < 103 mm	Mature male ≥ 103 mm	Mature male ± CI	Mature male distribution method*^	Legal male ≥ 110 mm	Preferred male ≥ 125 mm
1979	135.8	28.2	10.9	n/a	20.7	9.9
1980	476.3	80.0	33.1	n/a	49.0	16.7
1981	156.1	56.8	16.8	n/a	32.3	10.7
1982	74.3	71.3	26.1	n/a	46.0	16.3
1983	108.0	34.6	13.5	n/a	24.1	8.1
1984	67.2	25.8	9.6	n/a	18.5	5.3
1985	28.6	8.4	2.9	n/a	5.7	2.1
1986	49.3	13.5	10.5	n/a	6.5	1.1
1987	91.0	16.2	6.6	n/a	11.6	5.6
1988	198.0	39.9	21.1	n/a	28.8	13.5
1989	156.4	50.2	19.6	n/a	38.3	20.7
1990	130.0	65.5	35.9	65.5	53.4	30.9
1991	162.7	65.2	22.5	40.5	54.4	28.6
1992	101.9	43.2	15.5	16.5	35.1	20.5
1993	58.1	23.4	8.4	19.1	18.4	8.8
1994	46.8	20.0	6.4	7.3	15.9	7.3
1995	32.4	21.3	12.3	4.0	18.1	8.2
1996	24.3	15.0	11.1	3.1	11.7	5.4
1997	24.6	7.3	2.3	1.8	5.3	1.5
1998	49.1	7.4	2.5	3.8	4.7	1.5
1999	83.4	5.0	2.2	4.6	3.2	0.9
2000	71.5	6.0	1.8	3.6	3.8	0.9
2001	145.2	9.8	3.7	6.7	7.0	2.4
2002	128.8	9.1	3.2	8.5	5.5	1.7
2003	171.5	16.4	7.2	13.0	11.6	3.6
2004	207.5	29.2	15.9	17.0	18.9	4.1
2005	241.1	49.5	17.8	39.6	39.2	18.7
2006	287.0	72.3	30.4	23.6	54.8	25.9
2007	279.4	80.2	45.3	34.6	55.1	22.6
2008	110.8	62.2	29.9	46.7	46.2	18.5
2009	98.3	42.7	16.6	n/a	33.7	15.0
2010	114.2	45.7	21.5	30.1	37.5	19.1
2011	186.6	42.9	22.9	n/a	34.8	18.9
2012	223.8	28.7	8.1	18.0	20.0	8.3
2013	183.9	39.7	17.1	n/a	27.0	10.8
2014	140.4	68.0	17.8	51.7	43.8	16.1
2015	67.7	57.4	16.5	n/a	46.0	19.6
2016	75.2	62.2	15.5	25.4	51.3	24.7
2017	99.0	43.2	12.4	6.5	34.9	16.8
2018	173.0	41.8	11.4	11.4	35.1	17.2
2019	143.4	17.6	4.5	8.1	14.6	6.9

***** Abundance denoted with "n/a" when chela height data were not available for that year.

^ Values differ from 2018 Technical Memorandum due to adjustments to model (Lang et al. 2019).

Table 22. -- Time series of abundance estimates (in millions) for female Tanner crab (*Chionoecetes bairdi*) by size category (CW) and sex from National Marine Fisheries Service eastern Bering Sea bottom trawl surveys, west of 166° W. The 95% confidence intervals (CI) are 1.96 SE. See authors for 1975-1978 data.

Year	Immature female	Mature female	Mature female ± CI
1979	49.0	118.3	80.6
1980	159.2	380.4	259.6
1981	10.3	268.7	170.6
1982	15.5	433.1	265.7
1983	96.5	109.9	48.3
1984	59.0	70.1	36.8
1985	21.0	18.6	12.3
1986	24.1	8.3	4.6
1987	74.9	12.9	5.3
1988	129.9	38.1	18.6
1989	101.9	43.3	19.2
1990	75.1	107.5	91.6
1991	84.1	109.2	48.3
1992	48.6	97.0	43.1
1993	26.4	42.6	16.4
1994	34.3	29.2	15.6
1995	20.6	43.1	25.9
1996	15.0	26.2	22.3
1997	22.6	9.0	5.4
1998	44.7	6.6	3.1
1999	79.7	10.1	4.0
2000	57.0	7.3	3.6
2001	127.2	21.0	11.5
2002	111.6	19.1	10.9
2003	123.8	48.5	26.2
2004	169.9	27.7	13.5
2005	215.7	60.7	27.9
2006	178.1	76.4	31.2
2007	114.3	51.5	16.3
2008	53.4	48.6	21.8
2009	71.4	29.2	10.0
2010	91.6	21.9	10.1
2011	157.6	20.3	6.0
2012	122.0	25.6	8.9
2013	97.2	48.0	17.0
2014	90.4	43.6	23.7
2015	36.3	45.4	33.7
2016	42.1	42.6	27.3
2017	101.2	35.6	21.4
2018	166.2	30.3	13.2
2019	146.0	32.9	17.2

Table 23. -- Time series of biomass estimates (t) for male snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 95 mm	Mature male ≥ 95 mm	Mature male ± CI	Mature male distribution method*^	Legal male ≥ 78 mm	Preferred male ≥ 102 mm
1980	236,814	99,240	30,937	n/a	180,837	68,592
1981	166,540	38,042	8,061	n/a	97,286	22,630
1982	250,475	65,864	19,430	n/a	177,794	34,823
1983	184,837	68,047	18,468	n/a	163,096	35,087
1984	119,438	119,971	32,543	n/a	183,321	85,096
1985	44,214	55,691	12,225	n/a	79,334	43,099
1986	83,408	58,725	14,454	n/a	84,159	45,967
1987	266,342	107,536	23,901	n/a	178,662	74,290
1988	331,332	144,135	53,992	n/a	246,515	105,695
1989	372,788	143,216	29,275	199,560	291,753	92,421
1990	306,733	347,750	102,169	291,696	521,713	225,142
1991	293,255	347,976	105,727	193,540	477,618	278,678
1992	179,621	166,483	35,962	129,741	223,585	139,020
1993	273,570	98,857	22,246	126,136	143,013	77,228
1994	289,633	57,386	12,134	61,898	109,683	44,637
1995	368,026	61,758	20,003	117,692	158,155	38,179
1996	341,043	143,856	52,118	194,470	312,771	89,015
1997	209,131	232,388	57,042	135,552	362,928	171,516
1998	100,536	164,119	32,216	94,331	219,422	127,490
1999	44,127	67,352	13,850	26,125	87,096	52,043
2000	77,782	53,942	16,022	21,334	76,830	41,129
2001	167,671	56,449	11,370	49,974	106,070	39,995
2002	83,002	55,907	26,886	41,026	100,734	37,172
2003	81,606	44,423	10,558	38,434	72,396	31,535
2004	89,330	44,162	14,554	39,119	61,726	35,580
2005	184,025	50,072	10,120	86,152	105,971	39,847
2006	124,579	90,152	61,487	57,061	141,960	72,344
2007	140,003	99,875	36,249	91,992	162,108	74,720
2008	114,297	79,600	16,993	n/a	123,530	60,329
2009	98,468	103,188	30,883	61,665	149,588	77,510
2010	146,025	105,278	27,471	n/a	134,170	87,099
2011	149,214	111,662	25,824	86,455	145,916	94,381
2012	123,683	67,476	18,910	n/a	104,438	53,152
2013	100,506	58,389	14,779	66,922	99,733	43,126
2014	140,092	105,441	41,571	n/a	151,453	79,510
2015	85,434	46,410	14,071	38,301	71,550	35,838
2016	103,747	29,961	6,869	n/a	51,670	21,997
2017	188,851	29,363	7,301	58,062	52,272	20,617
2018	458,902	47,054	18,589	201,846	130,474	27,018
2019	284,181	54,550	19,151	202,712	175,907	28,955

* Biomass denoted with "n/a" when chela height data were not available for that year.

^ Values differ from 2018 Technical Memorandum due to adjustments to model (Lang et al. 2019).

Table 24. -- Time series of biomass estimates (t) for female snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature female	Mature female*	Mature female ± CI*
1980	27,575	271,682	174,119
1981	10,988	118,845	40,403
1982	3,654	141,492	43,943
1983	3,622	82,182	32,620
1984	14,119	39,369	15,417
1985	5,364	5,889	2,487
1986	26,043	15,174	6,209
1987	107,989	119,551	44,272
1988	36,803	165,619	57,314
1989	23,265	256,728	163,114
1990	38,213	174,942	72,149
1991	68,925	199,020	94,676
1992	49,374	123,479	48,802
1993	74,921	127,081	41,412
1994	68,240	122,604	33,649
1995	31,019	164,959	44,039
1996	9,274	104,429	31,008
1997	5,452	101,393	39,142
1998	13,324	70,183	38,534
1999	6,160	29,849	13,945
2000	12,480	93,882	99,120
2001	17,033	74,840	43,557
2002	4,388	29,508	18,448
2003	14,838	38,761	30,847
2004	30,472	47,743	26,154
2005	55,125	62,603	27,395
2006	28,090	50,592	20,186
2007	27,875	54,449	34,546
2008	8,994	49,352	22,756
2009	29,660	50,002	22,623
2010	90,479	94,956	34,177
2011	41,232	169,117	63,699
2012	41,425	143,268	65,922
2013	31,364	125,672	50,923
2014	54,523	111,362	46,704
2015	35,701	81,628	29,256
2016	53,788	52,022	21,010
2017	66,242	103,422	44,445
2018	83,164	161,573	63,268
2019	5,125	106,799	41,236

* 2018 and 2019 differences from previous six reports due to reanalysis of length-weight regression data.

Table 25. -- Time series of abundance estimates (in millions) for male snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 95 mm	Mature male ≥ 95 mm	Mature male ± CI	Mature male distribution method*^	Legal male ≥ 78 mm	Preferred male ≥ 102 mm
1980	2,567.0	194.8	65.0	n/a	513.4	116.6
1981	1,575.4	79.8	17.7	n/a	318.8	40.3
1982	1,779.0	145.3	44.0	n/a	591.1	65.0
1983	1,486.0	150.3	41.2	n/a	511.7	65.6
1984	1,223.6	237.6	62.8	n/a	476.1	148.3
1985	444.6	105.9	23.3	n/a	195.9	73.8
1986	1,143.1	110.6	27.0	n/a	211.2	78.2
1987	3,758.6	215.7	48.8	n/a	493.3	130.8
1988	3,677.9	276.9	94.8	n/a	683.8	178.5
1989	3,111.0	292.3	60.6	789.3	882.5	162.0
1990	2,263.9	710.4	214.0	807.1	1,348.1	395.1
1991	3,331.8	618.3	179.4	533.8	1,093.8	439.7
1992	2,776.2	293.2	62.7	392.3	512.9	223.3
1993	4,805.5	182.8	41.9	765.1	355.8	127.6
1994	4,116.9	106.4	22.2	353.6	320.6	73.8
1995	3,635.3	128.0	43.9	625.6	515.7	67.3
1996	2,309.8	302.4	105.2	774.3	958.6	161.4
1997	1,204.4	447.1	100.4	362.8	945.8	290.8
1998	778.2	308.4	59.3	259.1	514.6	214.9
1999	422.4	124.9	23.9	79.8	198.8	85.7
2000	971.1	102.4	31.8	109.2	191.1	69.8
2001	1,529.4	111.3	24.1	256.7	312.7	69.3
2002	596.3	114.7	54.8	145.9	284.5	66.6
2003	1,073.7	88.1	21.3	135.8	196.0	55.0
2004	1,491.2	79.9	24.2	158.3	147.8	58.0
2005	1,890.3	89.2	17.6	452.8	312.5	63.0
2006	1,178.4	171.9	119.4	321.6	377.6	126.4
2007	1,260.8	196.7	67.0	364.2	435.0	132.5
2008	1,008.8	154.3	31.6	n/a	325.2	105.1
2009	1,055.4	195.7	57.9	190.7	371.5	129.9
2010	2,460.5	184.4	45.1	n/a	293.7	138.3
2011	1,829.8	194.1	45.7	315.5	330.8	150.1
2012	1,384.9	123.5	34.3	n/a	274.1	87.0
2013	1,055.9	112.6	27.6	249.5	280.0	73.6
2014	1,527.8	204.2	76.8	n/a	385.3	138.5
2015	1,504.2	84.2	22.3	131.1	183.8	57.2
2016	2,361.9	57.8	13.2	n/a	143.2	37.4
2017	3,541.7	58.0	14.0	397.3	151.9	36.0†
2018	5,773.1	100.6	41.2	1,431.1	437.8	49.4
2019	2,018.0	119.7	42.8	1,034.8	611.1	53.7

* Abundance denoted with "n/a" when chela height data were not available for that year.

^ Values differ from 2018 Technical Memorandum due to adjustments to model (Lang et al. 2019).

† Corrected value: 2017 and 2018 Technical Memoranda reported incorrect value in error (Lang et al. 2018; Lang et al. 2019).

Table 26. -- Time series of abundance estimates (in millions) for female snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature female	Mature female*	Mature female ± CI*
1980	898.5	4,830.3	3,219.6
1981	233.3	2,047.8	713.9
1982	79.9	2,317.2	770.8
1983	240.5	1,466.0	611.0
1984	551.9	670.0	273.8
1985	213.0	103.4	44.7
1986	842.1	267.4	110.5
1987	2,955.5	2,040.2	768.0
1988	1,045.8	2,795.6	975.4
1989	564.7	4,625.9	3,417.8
1990	1,043.9	3,008.7	1,392.7
1991	2,270.7	3,545.4	1,930.8
1992	1,862.2	2,068.9	849.0
1993	2,909.2	2,396.3	818.2
1994	2,684.2	2,204.8	552.4
1995	1,021.7	3,109.1	825.9
1996	258.4	2,107.2	680.4
1997	142.9	2,001.0	813.2
1998	336.0	1,386.7	791.2
1999	187.6	551.0	270.0
2000	391.9	1,649.1	1,711.0
2001	470.9	1,243.8	727.5
2002	121.1	502.8	342.5
2003	542.4	680.2	601.4
2004	1,375.9	931.9	525.2
2005	1,512.2	1,110.9	498.3
2006	765.7	744.3	304.8
2007	620.4	839.6	623.2
2008	395.9	747.7	445.2
2009	1,059.9	747.2	356.6
2010	3,027.6	1,777.8	654.1
2011	1,175.4	3,137.0	1,190.0
2012	1,165.5	2,656.1	1,309.6
2013	1,029.4	2,222.2	994.7
2014	1,590.8	1,815.6	894.7
2015	1,461.0	1,238.6	497.4
2016	2,131.6	818.4	347.2
2017	2,494.8	2,086.9	923.7
2018	2,588.7	3,282.0	1,341.3
2019	117.3	2,040.9	785.5

Table 27. -- Time series of biomass estimates (t) for hair crab (*Erimacrus isenbeckii*) by size category (CL) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Sublegal male < 83 mm	Legal male ≥ 83 mm	Legal male ± CI	Total female	Total female ± CI
1980	988	16,164	11,703	758	1,041
1981	183	10,091	3,658	182	114
1982	182	6,717	3,942	120	70
1983	67	4,231	1,331	296	152
1984	310	3,048	999	106	94
1985	83	2,084	1,041	73	57
1986	207	1,482	787	100	69
1987	355	1,083	607	208	110
1988	631	618	354	168	89
1989	2,955	404	240	43	40
1990	2,540	783	453	255	155
1991	1,393	795	434	230	130
1992	778	591	300	80	53
1993	1,111	2,296	1,588	217	148
1994	1,324	2,413	1,253	194	133
1995	1,396	4,326	2,791	158	84
1996	1,152	3,163	1,738	277	132
1997	584	3,103	1,289	92	56
1998	213	1,984	798	361	241
1999	196	1,735	510	308	125
2000	180	2,873	1,259	331	180
2001	132	1,287	521	565	243
2002	65	1,375	529	101	64
2003	357	659	275	83	49
2004	204	491	191	83	71
2005	328	212	132	273	134
2006	357	661	415	877	954
2007	575	1,278	519	357	168
2008	623	1,346	631	387	174
2009	1,104	1,916	731	464	250
2010	903	1,610	677	469	186
2011	1,752	2,129	935	377	162
2012	3,626	2,878	1,128	534	234
2013	3,357	6,469	2,626	1,055	433
2014	1,144	3,391	1,298	304	139
2015	616	1,338	511	127	74
2016	213	716	307	71	50
2017	208	1,084	364	71	45
2018	332	886	338	195	105
2019	459	552	238	147	89

Table 28. -- Time series of abundance estimates (in millions) for hair crab (*Erimacrus isenbeckii*) by size category (CL) and sex from National Marine Fisheries Service bottom trawl surveys, all Districts combined. The 95% confidence intervals (CI) are 1.96 SE.

Year	Sublegal male	Legal male	Legal male	Total female	Total female
	< 83 mm	≥ 83 mm	± CI		± CI
1980	3.0	20.8	15.2	4.8	7.8
1981	0.5	12.2	4.5	0.5	0.3
1982	0.6	8.4	4.9	0.4	0.2
1983	0.3	5.3	1.7	0.9	0.5
1984	1.1	3.8	1.3	0.4	0.3
1985	0.3	2.5	1.3	0.3	0.2
1986	0.7	1.9	1.0	0.4	0.3
1987	1.6	1.4	0.7	0.9	0.4
1988	3.9	0.8	0.4	0.9	0.7
1989	12.6	0.5	0.3	0.1	0.1
1990	10.1	1.2	0.8	1.0	0.6
1991	4.8	1.3	0.7	1.2	0.7
1992	2.5	1.1	0.6	0.5	0.4
1993	3.8	3.9	2.6	1.3	1.0
1994	5.0	4.0	2.1	1.3	1.1
1995	5.0	6.6	4.3	0.7	0.3
1996	3.6	5.1	2.7	1.0	0.5
1997	1.7	4.6	1.8	0.4	0.2
1998	0.6	2.9	1.1	1.3	0.8
1999	0.6	2.4	0.7	1.2	0.4
2000	0.5	4.1	1.7	1.2	0.7
2001	0.5	1.8	0.7	2.2	1.0
2002	0.3	2.0	0.8	0.5	0.3
2003	1.3	0.9	0.4	0.5	0.3
2004	0.6	0.8	0.3	0.3	0.2
2005	1.0	0.3	0.2	0.8	0.5
2006	1.2	1.0	0.7	3.6	4.6
2007	2.3	1.9	0.7	1.3	0.9
2008	2.3	2.2	1.0	1.4	0.6
2009	3.6	3.1	1.1	1.7	0.9
2010	3.3	2.5	1.0	2.2	1.1
2011	6.9	3.5	1.4	1.6	0.6
2012	11.8	4.6	1.8	2.2	0.8
2013	10.3	10.7	4.6	4.0	1.7
2014	3.3	5.4	2.0	1.0	0.4
2015	1.8	2.1	0.8	0.6	0.3
2016	0.6	1.2	0.5	0.3	0.3
2017	0.6	1.6	0.6	0.3	0.2
2018	1.1	1.4	0.5	0.8	0.5
2019	1.8	0.8	0.3	0.5	0.3

Table 29. -- Time series of biomass estimates (t) for Norton Sound red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from the National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 94 mm	Mature male ≥ 94 mm	Mature male ± CI	Legal male ≥ 104 mm	Immature female	Mature female	Mature female ± CI
2010	263	1,656	1,598	1,030	36	334	220
2017	296	1,192	951	1,070	36	213	205
2019	1,364	711	539	526	414	240	175

Table 30. -- Time series of abundance estimates (in millions) for Norton Sound red king crab (*Paralithodes camtschaticus*) by size category (CL) and sex from the National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 94 mm	Mature male ≥ 94 mm	Mature male ± CI	Legal male ≥ 104 mm	Immature female	Mature female	Mature female ± CI
2010	1.1	1.7	1.6	0.9	0.3	0.6	0.5
2017	1.5	1.0	0.8	0.8	1.1	0.3	0.3
2019	4.8	0.6	0.4	0.4	2.6	0.5	0.4

Table 31. -- Time series of biomass estimates (t) for northern Bering Sea blue king crab (*Paralithodes platypus*) by size category (CL) and sex from National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 105 mm	Mature male ≥ 105 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
2010	602	578	387	46	393	605	347
2017	1,237	2,315	1,726	1,274	810	1,468	1,324
2018*	689	1,096	1,490	460	44	1,111	1,385
2019	122	565	447	102	51	474	361

*2018 rapid assessment had fewer stations and a different survey grid.

Table 32. -- Time series of abundance estimates (in millions) for northern Bering Sea blue king crab (*Paralithodes platypus*) by size category (CL) and sex from National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 105 mm	Mature male ≥ 105 mm	Mature male ± CI	Legal male ≥ 120 mm	Immature female	Mature female	Mature female ± CI
2010	1.4	0.5	0.3	0	1.3	0.9	0.5
2017	2.5	1.7	1.2	0.8	2.4	2.4	2.1
2018*	1.2	0.8	1.1	0.3	0.1	1.8	2.3
2019	0.4	0.5	0.4	0.1	0.2	0.8	0.7

*2018 rapid assessment had fewer stations and a different survey grid.

Table 33. -- Time series of biomass estimates (t) for male snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 68 mm	Mature male ≥ 68 mm	Mature male ± CI	Mature male distribution method	Legal male ≥ 78 mm	Preferred male ≥ 102 mm
2010	181,623	734	520	15,308	8	0
2017	135,802	349	206	3,104	75	38
2018*	115,491	3,799	6,528	15,119	1,195	0
2019	100,967	37,018	22,239	32,425	16,503	739

*2018 rapid assessment had fewer stations and a different survey grid.

Table 34. -- Time series of biomass estimates (t) for female snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature female	Mature female	Mature female ± CI
2010	130,500	21,557	8,594
2017	80,918	6,147	2,558
2018*	56,667	3,265	3,111
2019	20,635	8,504	4,781

*2018 rapid assessment had fewer stations and a different survey grid.

Table 35. -- Time series of abundance estimates (in millions) for male snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature male < 68 mm	Mature male ≥ 68 mm	Mature male ± CI	Mature male distribution method	Legal male ≥ 78 mm	Preferred male ≥ 102 mm
2010	6,833.5	5.6	4.0	249.0	0	0
2017	7,365.2	2.2	1.3	58.7	0.2	0.1
2018*	4,318.7	22.8	38.7	308.0	4.9	0
2019	2,211.8	200.9	113.1	284.0	66.0	1.5

*2018 rapid assessment had fewer stations and a different survey grid.

Table 36. -- Time series of abundance estimates (in millions) for female snow crab (*Chionoecetes opilio*) by size category (CW) and sex from National Marine Fisheries Service northern Bering Sea bottom trawl surveys. The 95% confidence intervals (CI) are 1.96 SE.

Year	Immature female	Mature female	Mature female ± CI
2010	6,000.7	462.0	182.2
2017	4,764.6	152.3	65.3
2018*	2,290.4	92.8	94.2
2019	874.7	178.0	99.2

*2018 rapid assessment had fewer stations and a different survey grid.

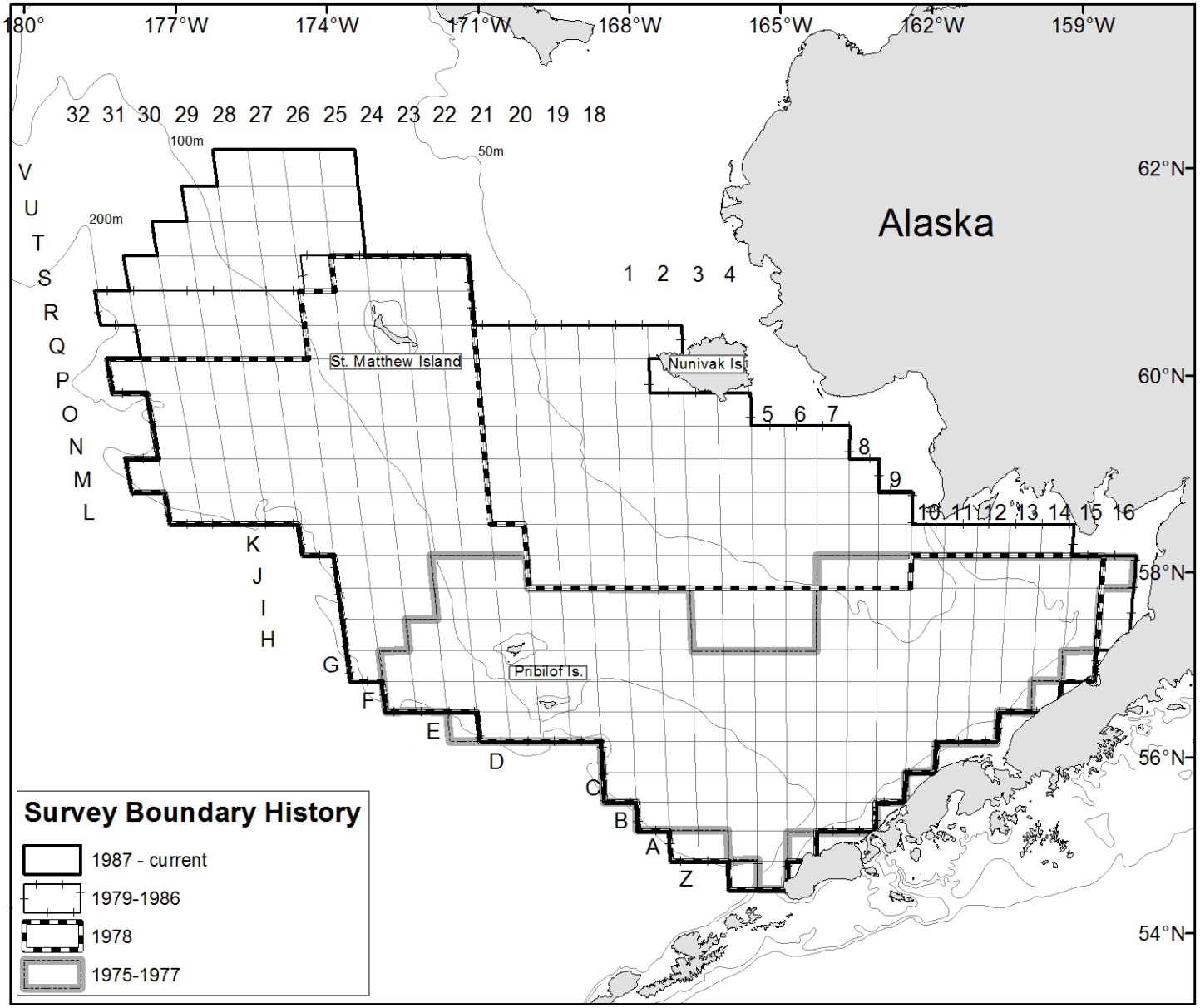


Figure 1. -- National Marine Fisheries Service eastern Bering Sea bottom trawl survey boundary from 1975 to present indicating four major stanzas in total coverage.

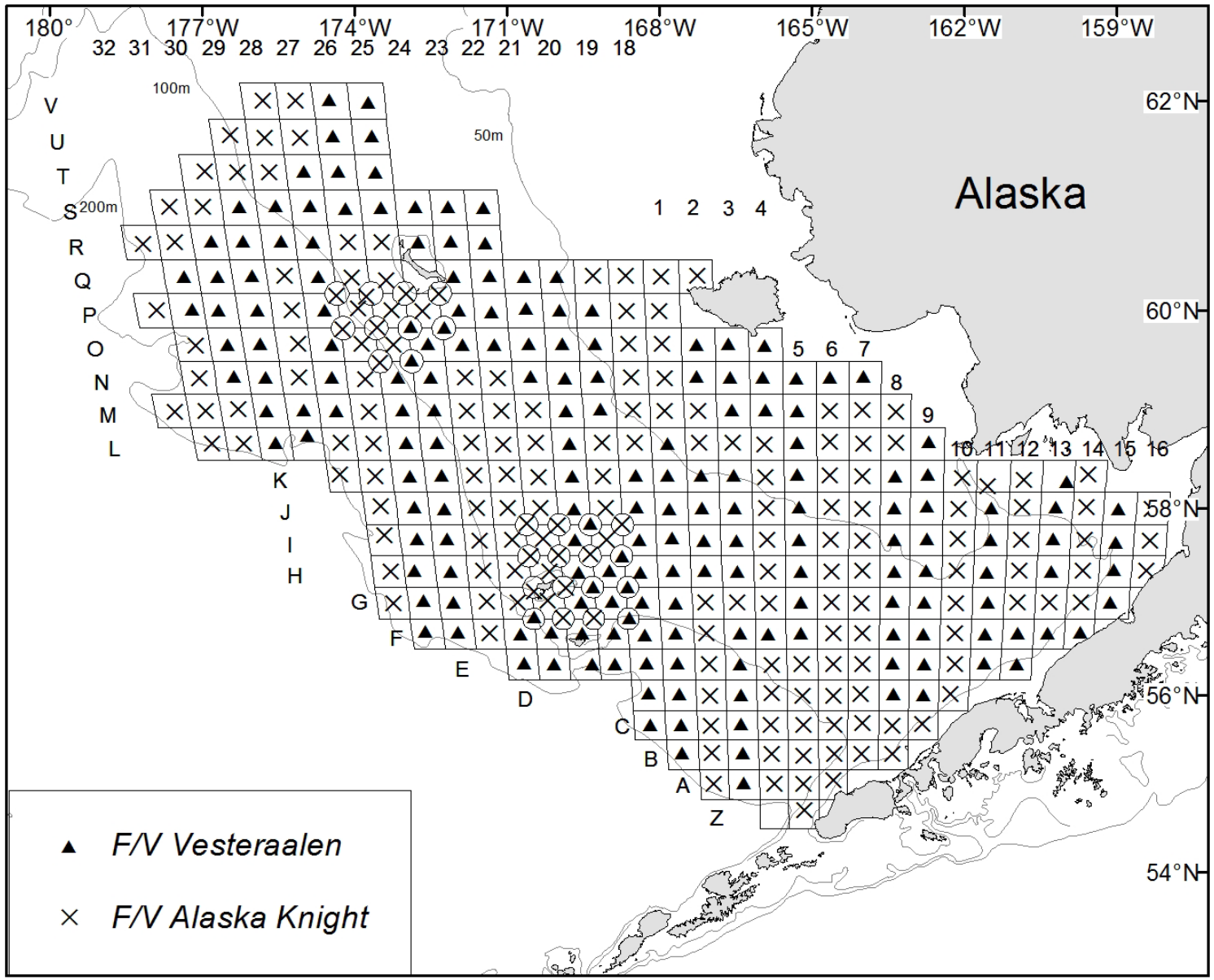


Figure 2. -- National Marine Fisheries Service eastern Bering Sea standard bottom trawl area surveyed by the FV *Alaska Knight* and the FV *Vesteraalen* from 3 June to 28 July 2019.

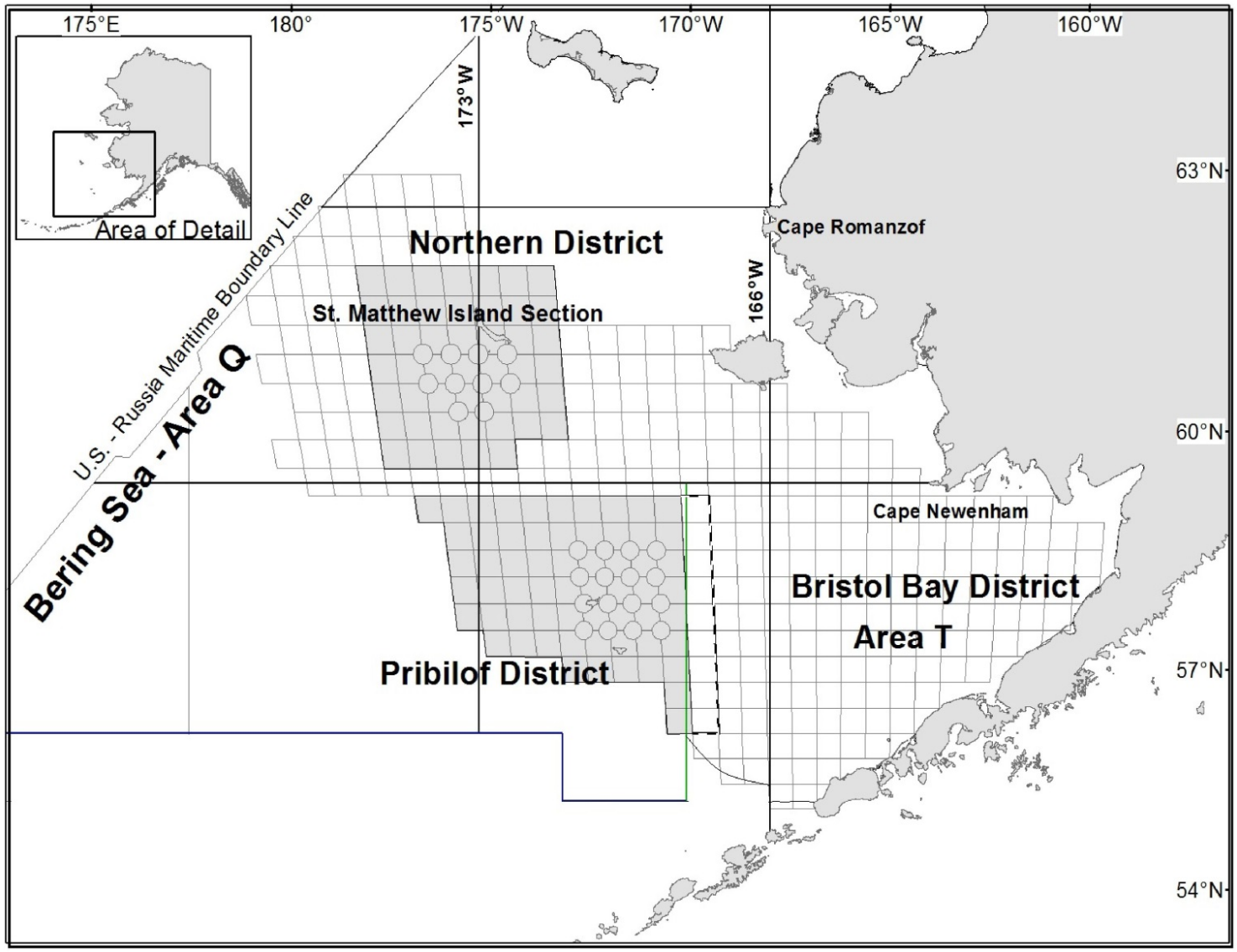


Figure 3. -- Alaska Department of Fish and Game commercial crab management units within the 2019 eastern Bering Sea bottom trawl survey area. Grey areas represent stations included in the Pribilof District (dashed line indicates expanded stock boundary for blue king crab) and St. Matthew Island Section, Northern District sampling strata and circles represent the high-density sampling areas.

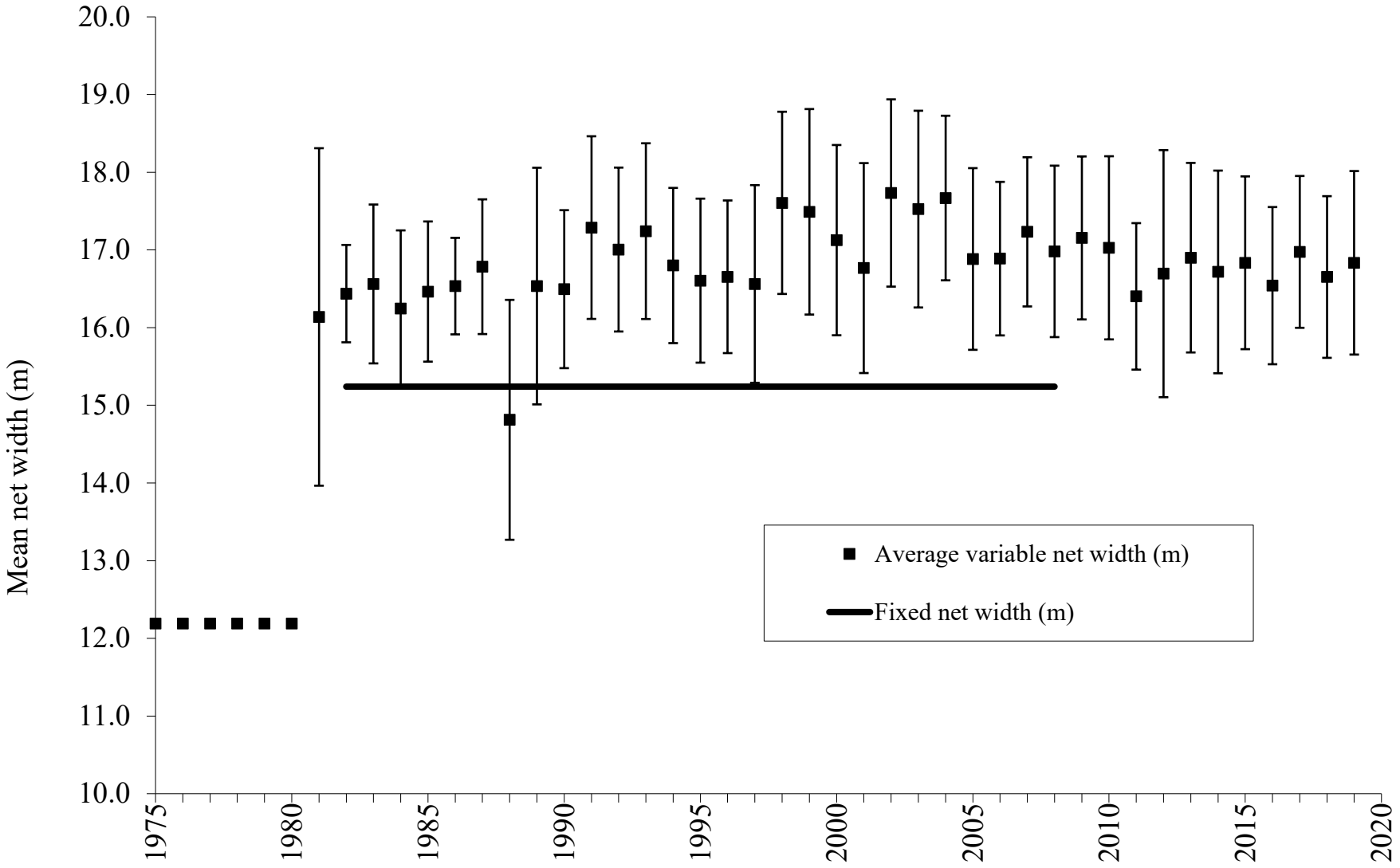


Figure 4. -- Fixed and average variable net widths (± SD) used to calculate area-swept by National Marine Fisheries Service eastern Bering Sea standard bottom trawls from 1975 to the present.

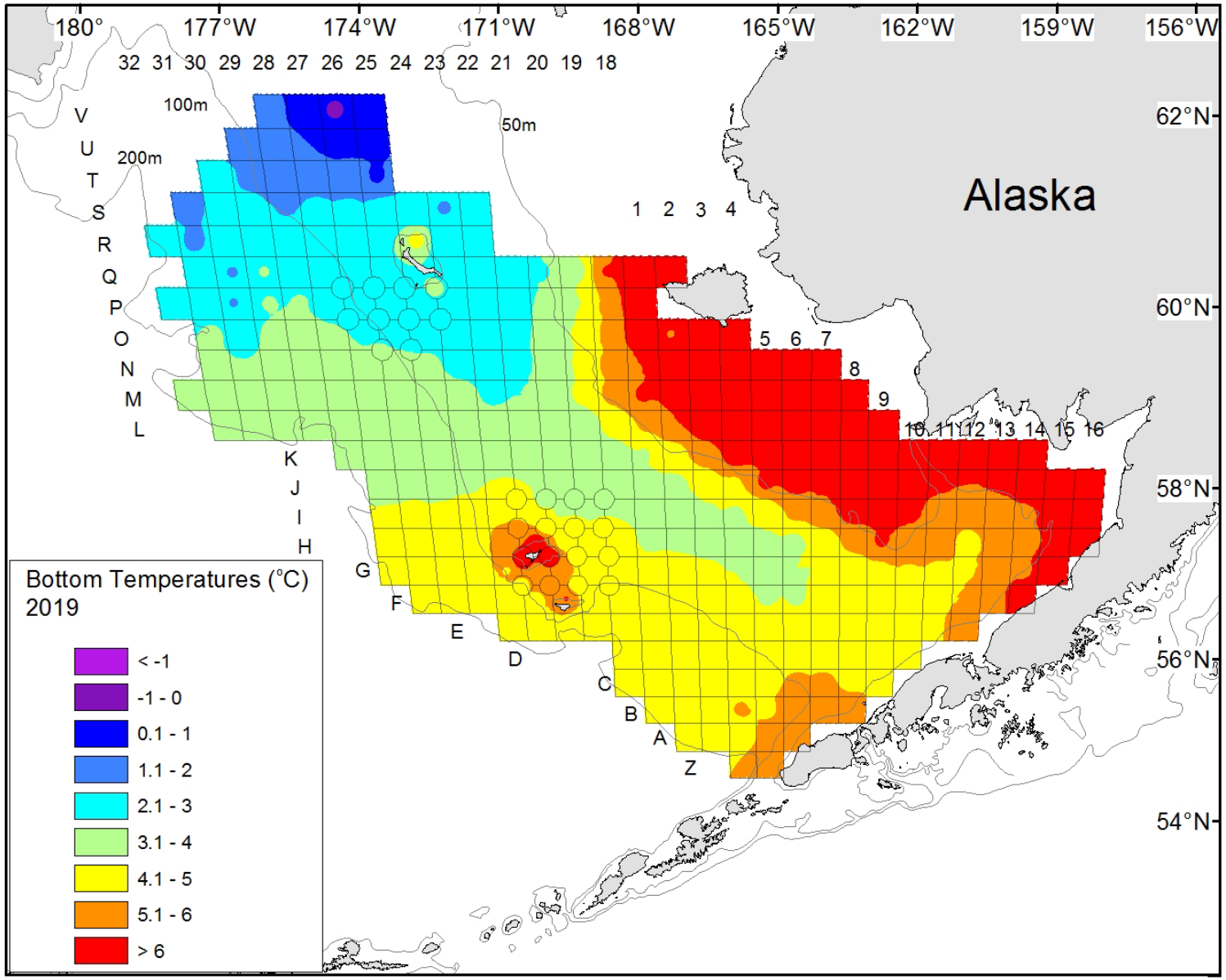


Figure 5. -- Bottom temperatures (°C) measured at stations from the National Marine Fisheries Service eastern Bering Sea bottom trawl survey, beginning 3 June 2019 in Bristol Bay and ending on 28 July 2019 at the northern edge of the survey.

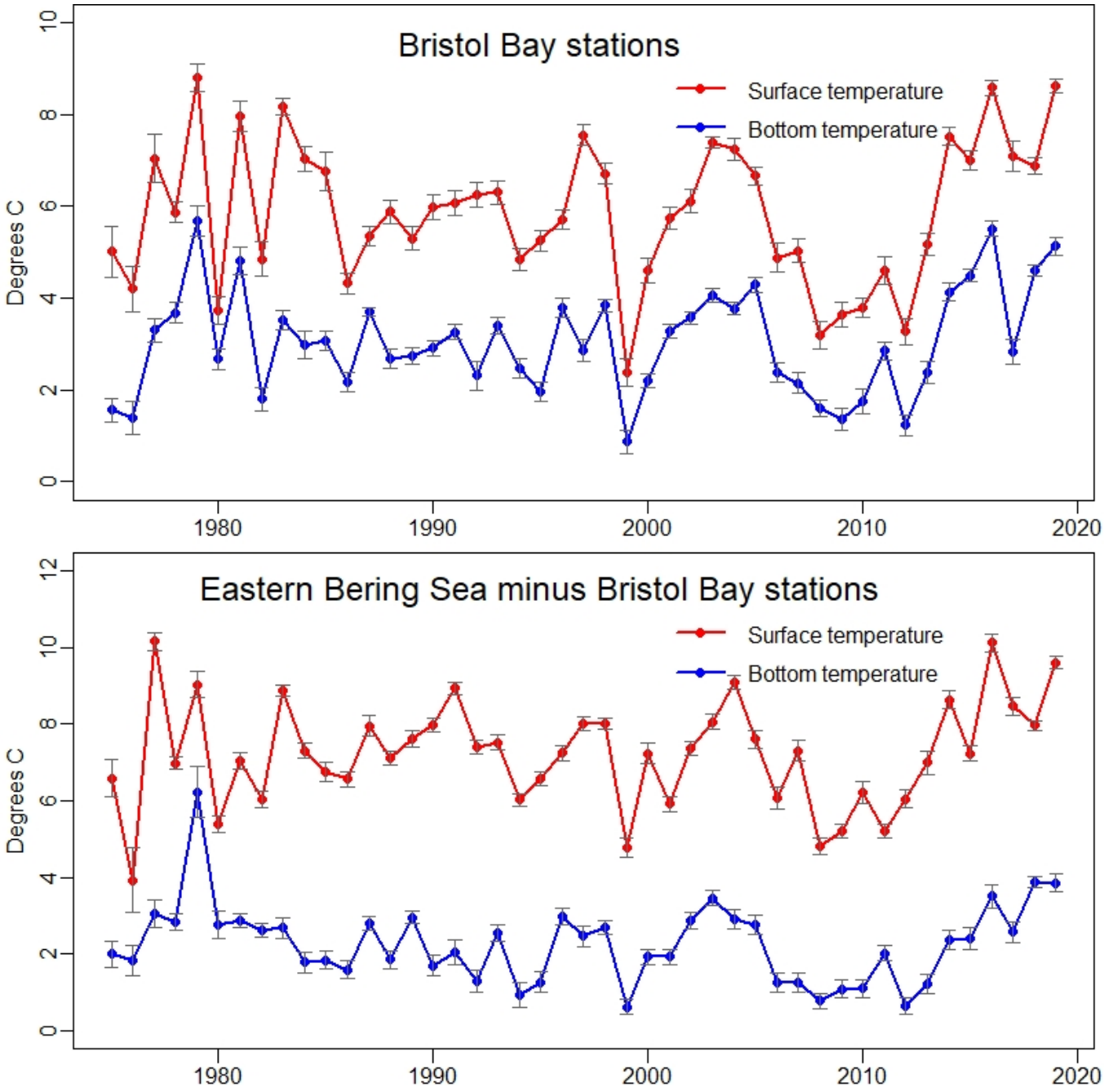


Figure 6. -- Average (± 95% CI) bottom (blue) and surface (red) temperatures for Bristol Bay (standard) stations and the rest of the eastern Bering Sea during the National Marine Fisheries Service's eastern Bering Sea bottom trawl survey. The number of stations used to calculate averages was not constant among years, particularly as the survey boundary expanded from 1975 to 1987.

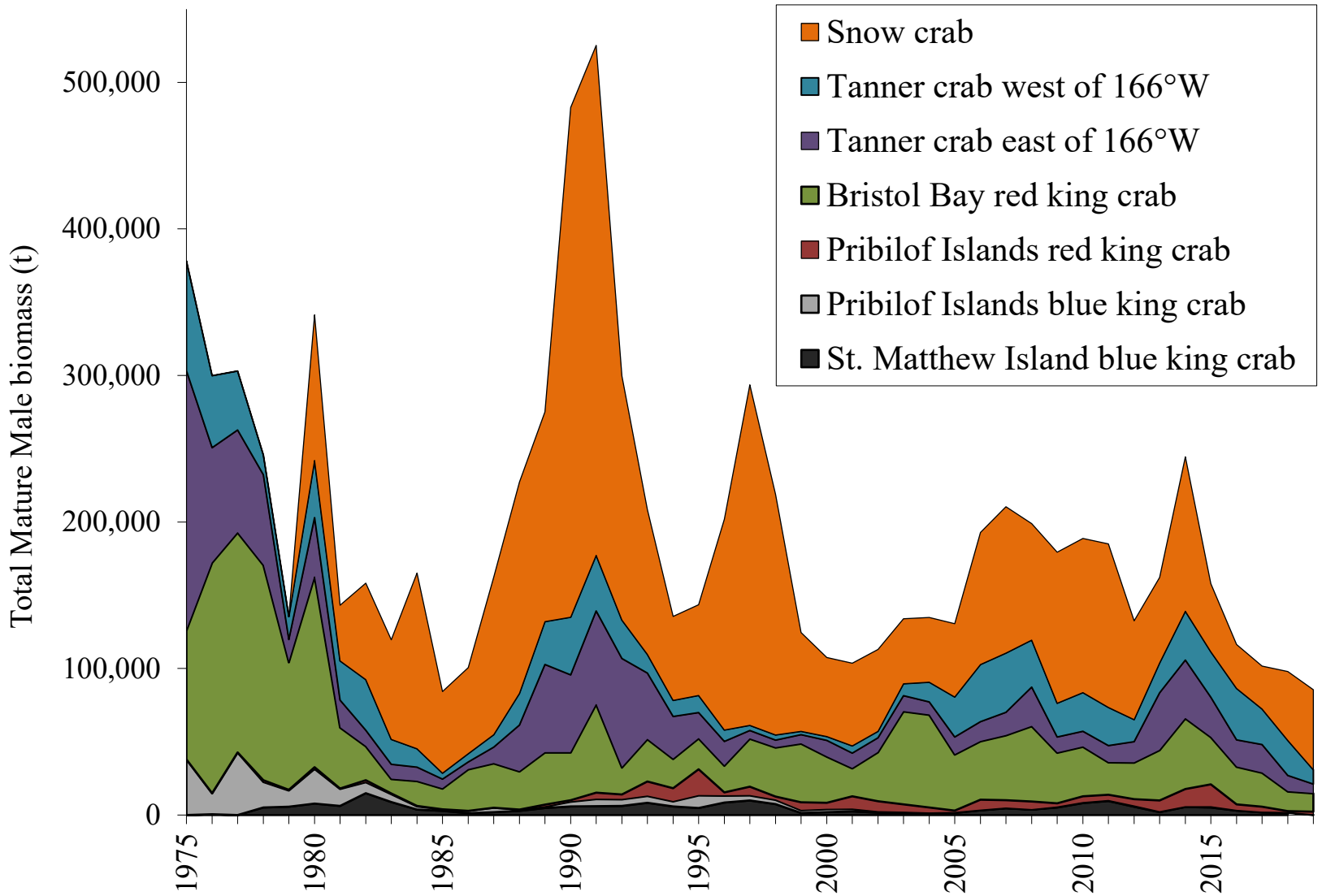


Figure 7. -- Historical mature male biomass (t) for six commercial species caught on National Marine Fisheries Service eastern Bering Sea bottom trawl surveys.

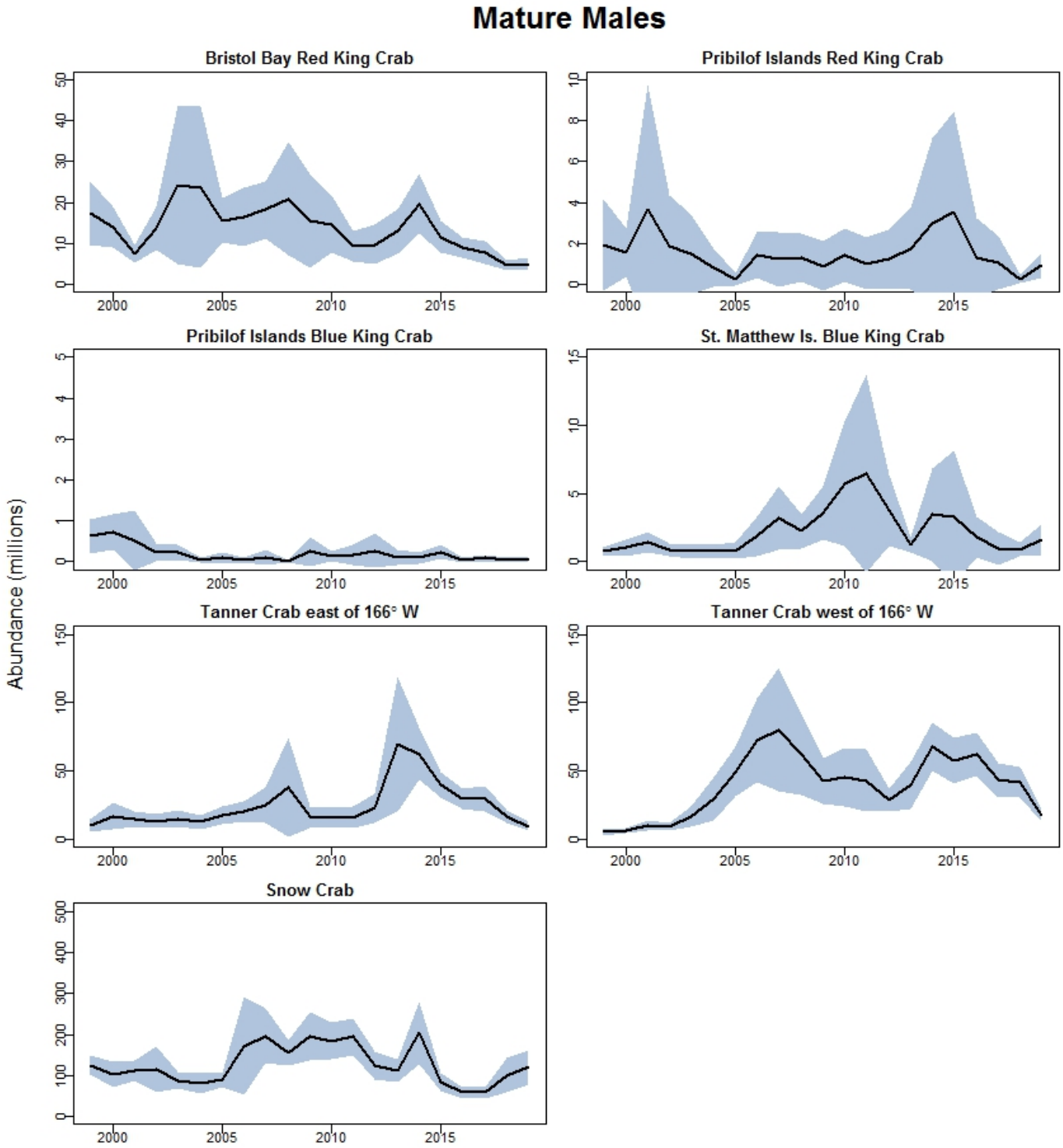


Figure 8. -- Historical mature male abundance (millions, gray area indicates ± 95% CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys (1998-2019).

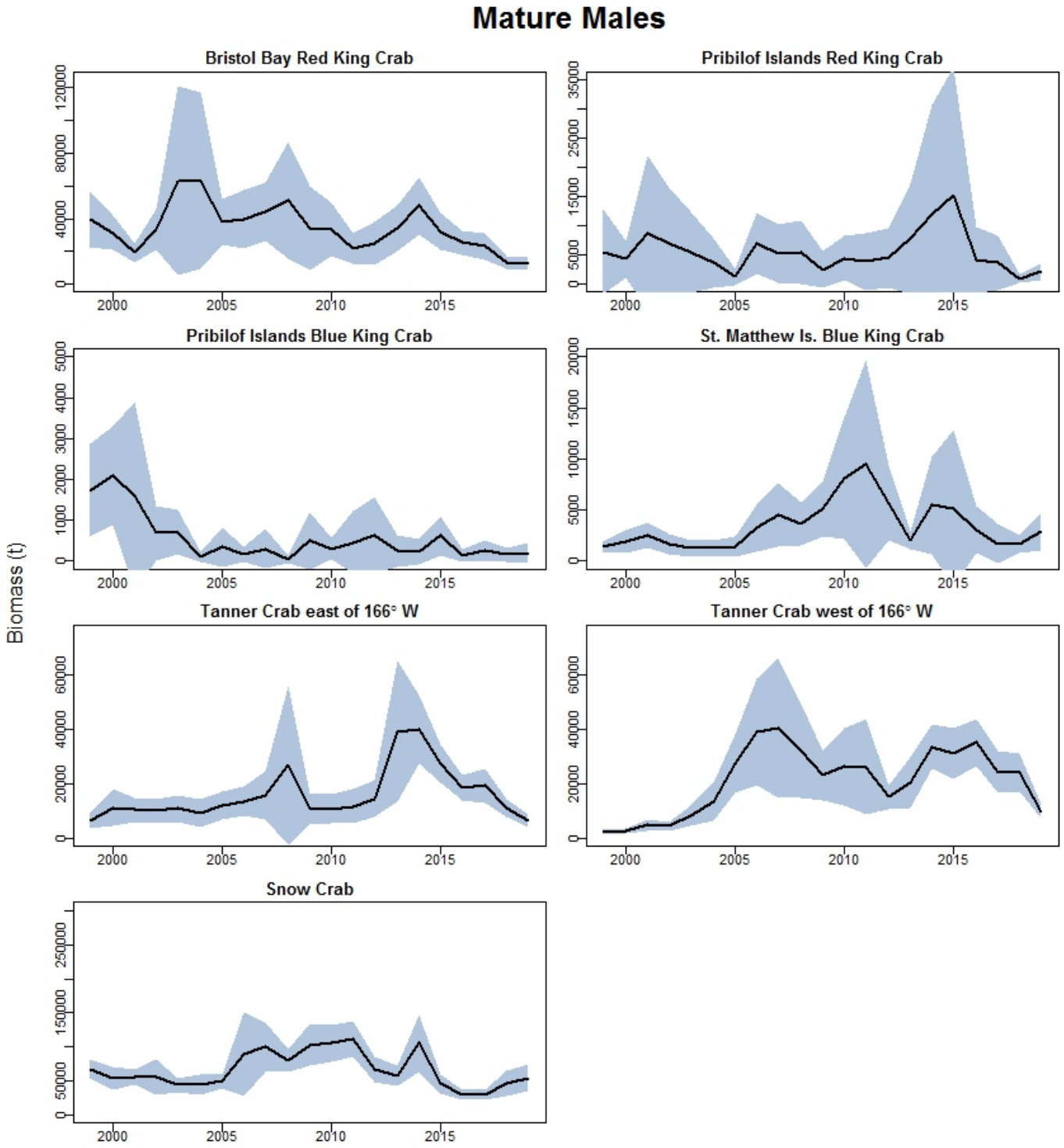


Figure 9. -- Historical mature male biomass (t, gray area indicates ± 95% CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl surveys (1998-2019).

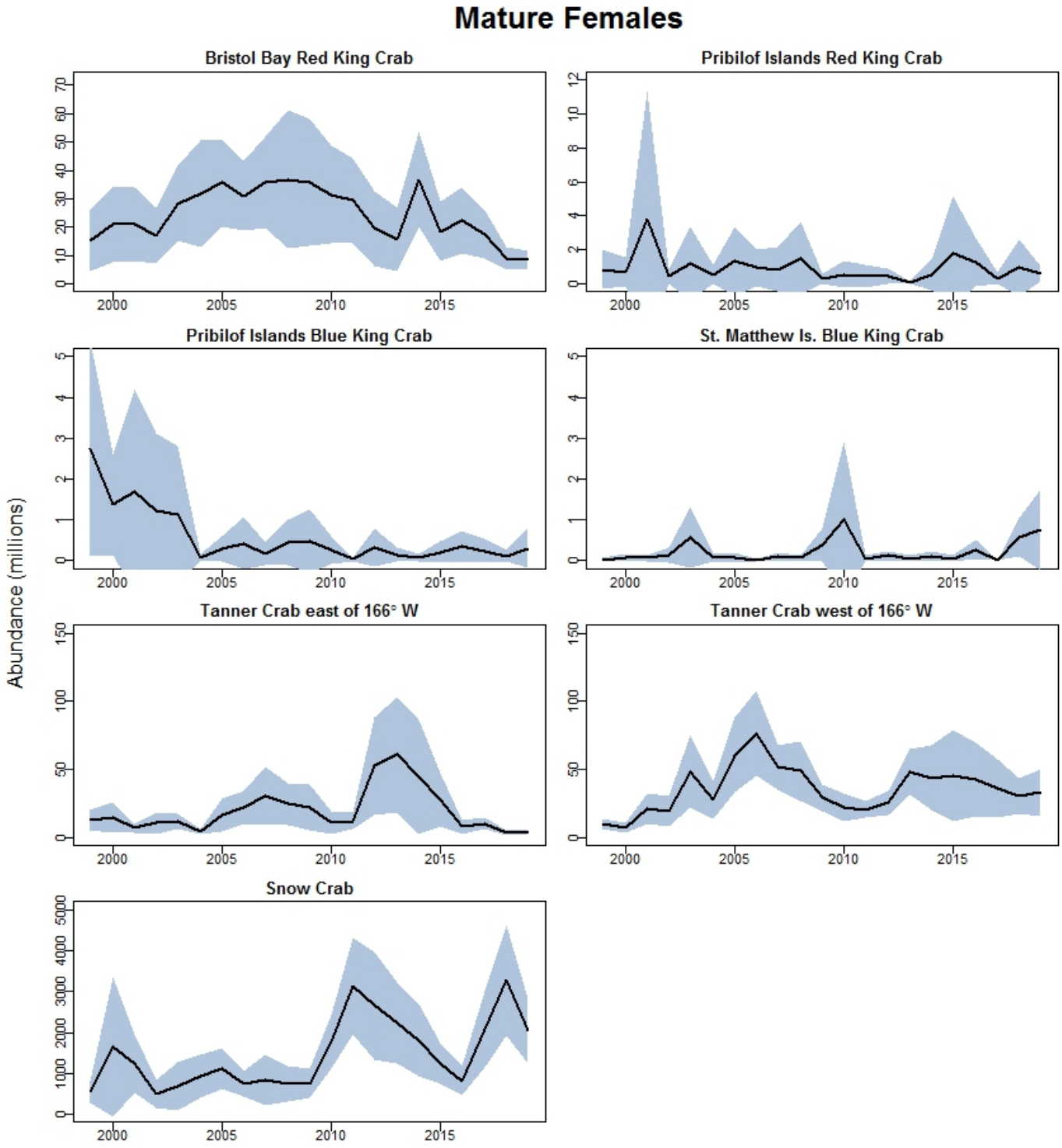


Figure 10. -- Historical mature female abundance (millions, gray area indicates ± 95% CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey (1998-2019). Abundance was calculated using actual maturity (abdominal flap morphology and clutch fullness index) as opposed to the size cut-off method used for males.

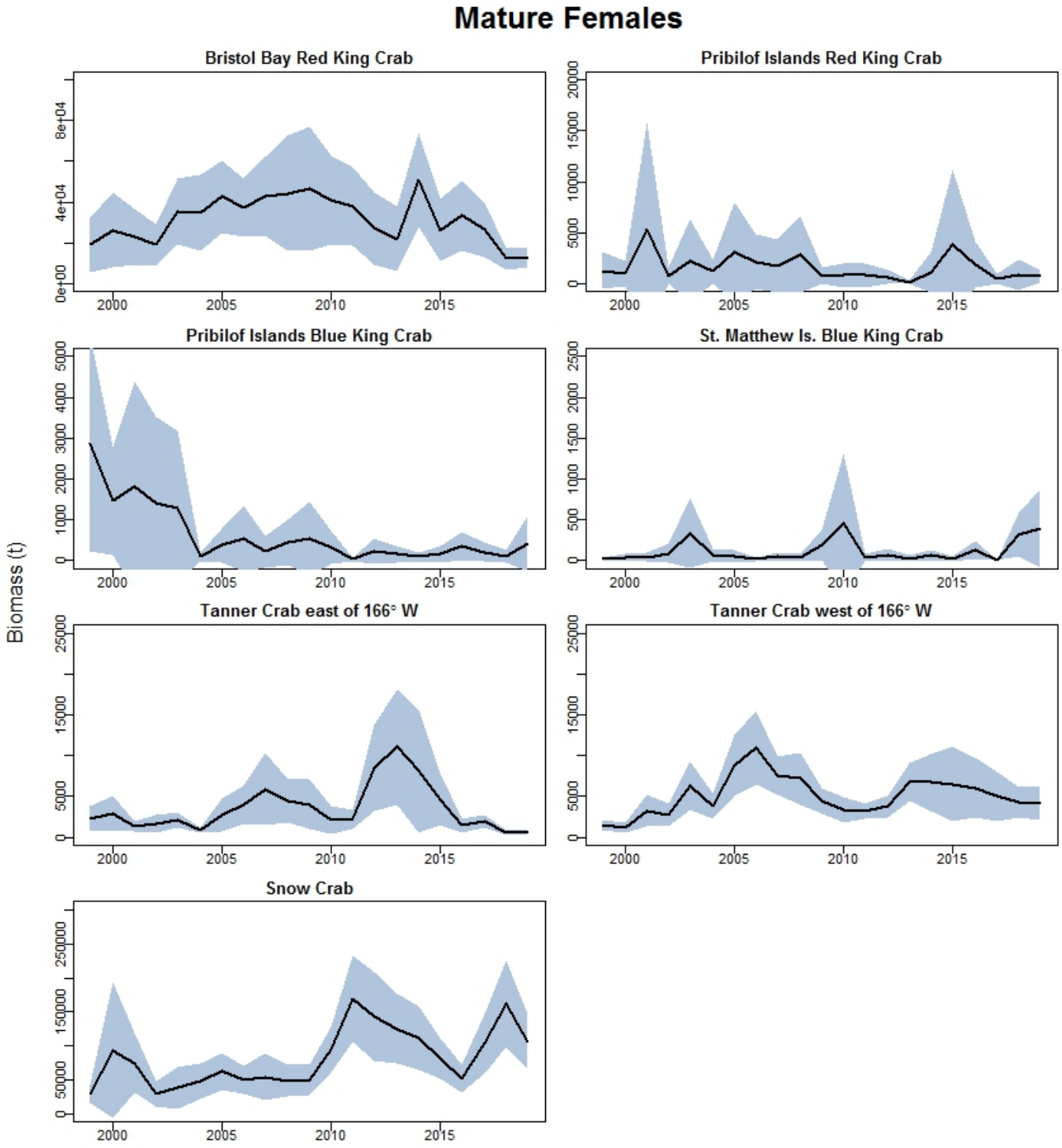


Figure 11. -- Historical mature female biomass (t, gray area indicates ± 95% CI) for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey (1998-2019). Biomass was calculated using actual maturity (abdominal flap morphology and clutch fullness index), as opposed to the size cut-off method used for males.

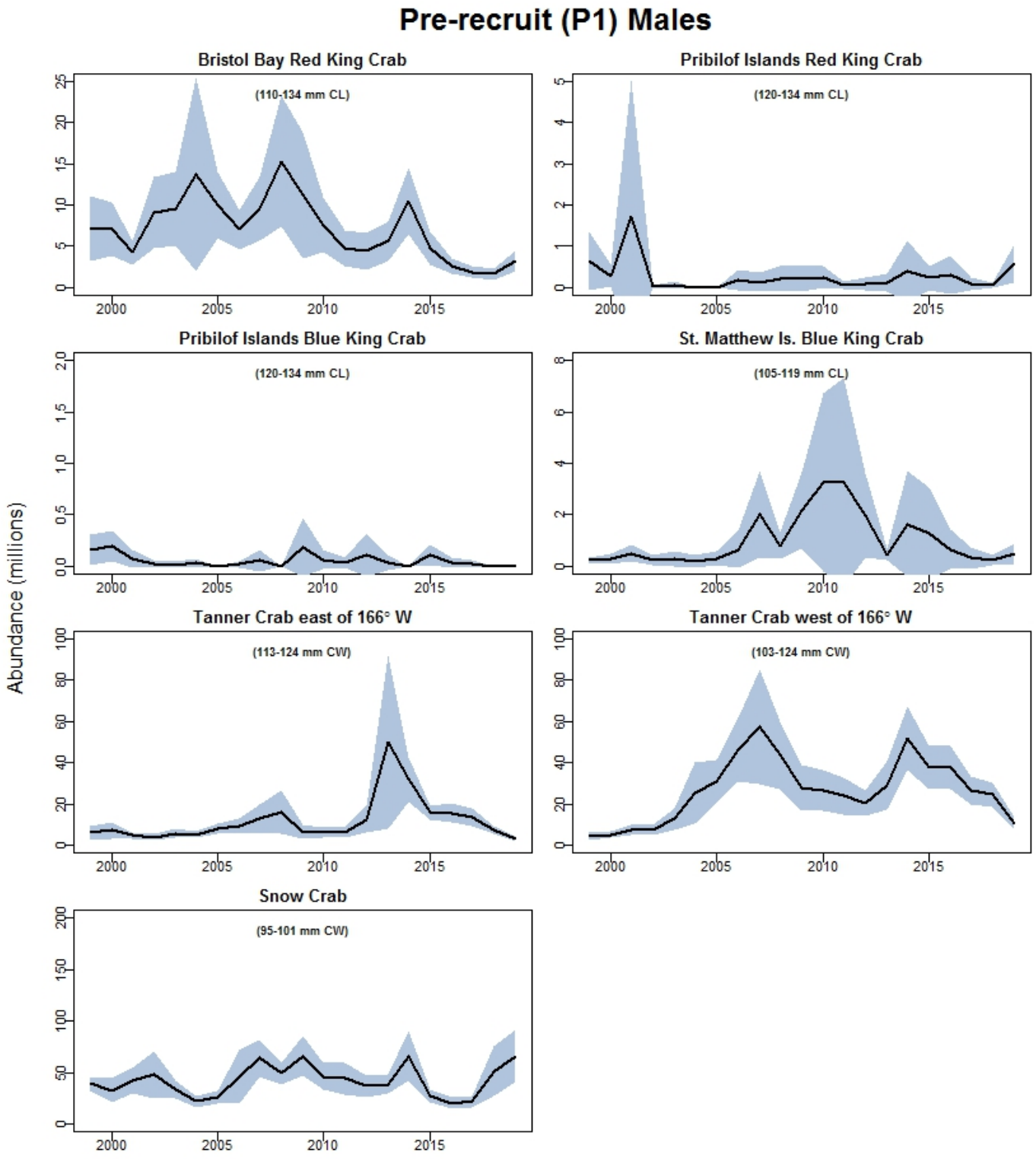


Figure 12. -- Historical abundance (millions, gray area indicates ± 95% CI) of pre-recruit (P1) males for six commercial species caught on the National Marine Fisheries Service eastern Bering Sea bottom trawl survey (1998-2019).

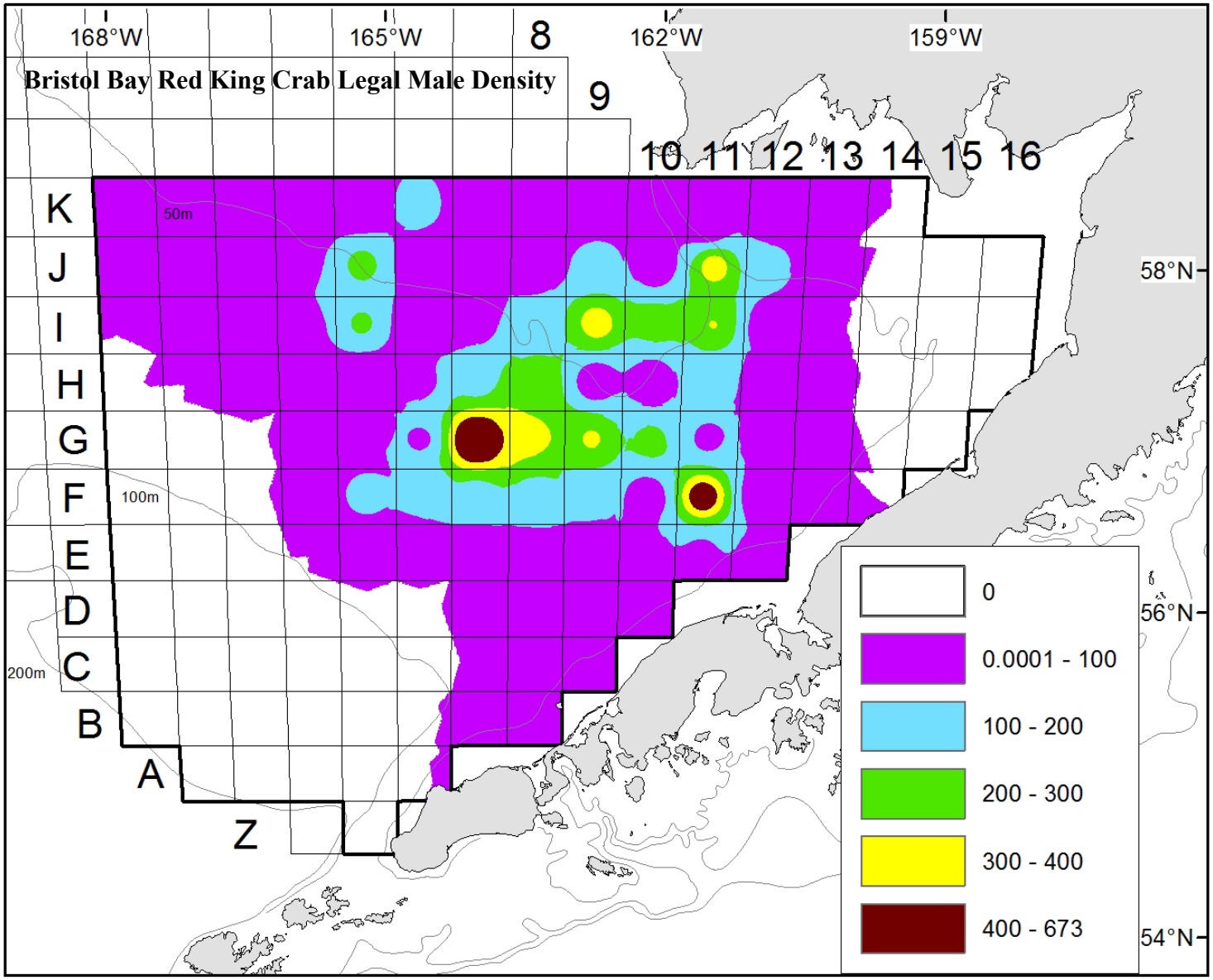


Figure 13. -- Estimated total density (number nmi^{-2}) of legal-sized male red king crab (*Paralithodes camtschaticus*) at each station sampled in the 2019 Bristol Bay District. Outlined area depicts the management district.

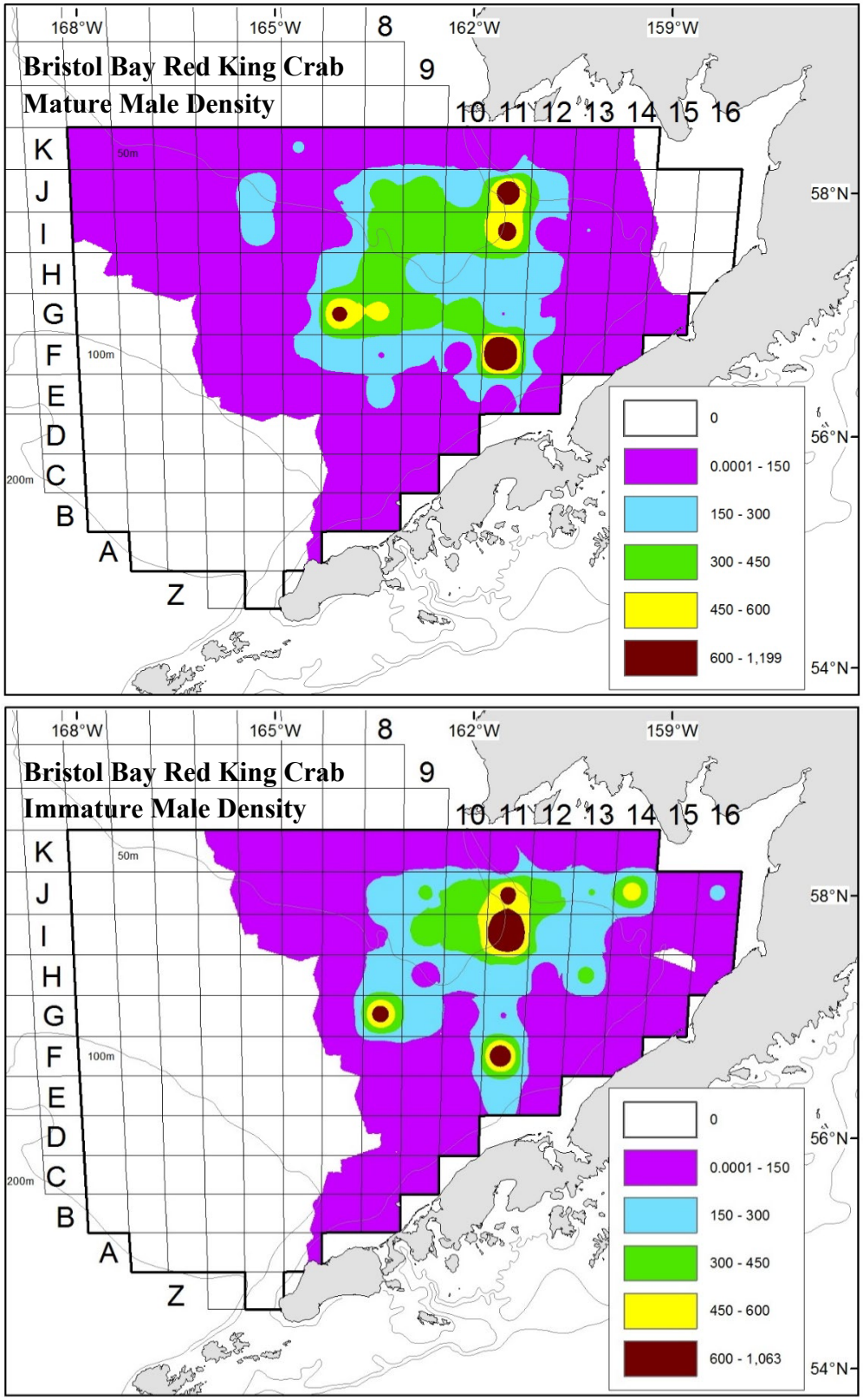


Figure 14. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the 2019 Bristol Bay District. Outlined area depicts the management district.

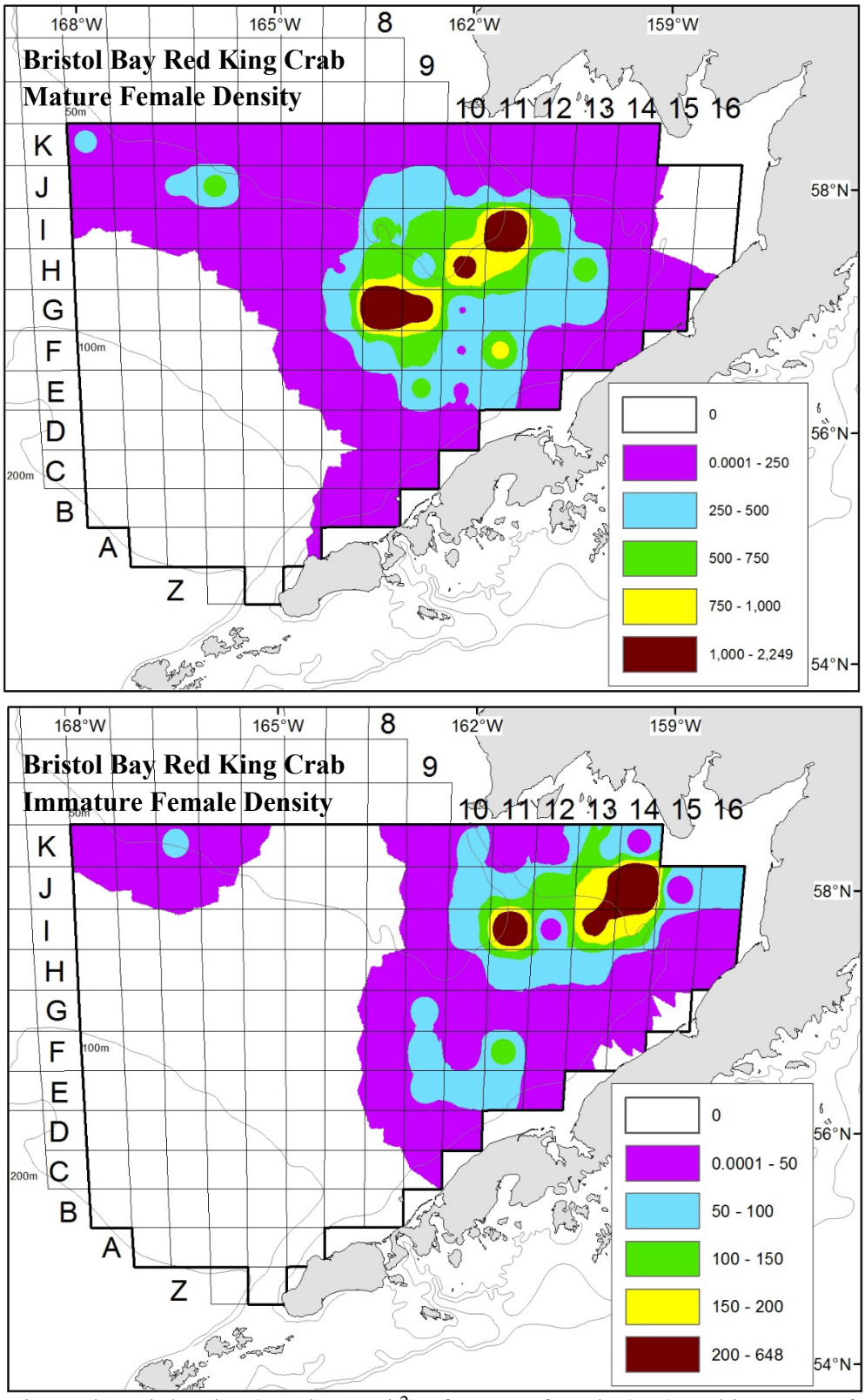


Figure 15. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the 2019 Bristol Bay District. Outlined area depicts the management district.

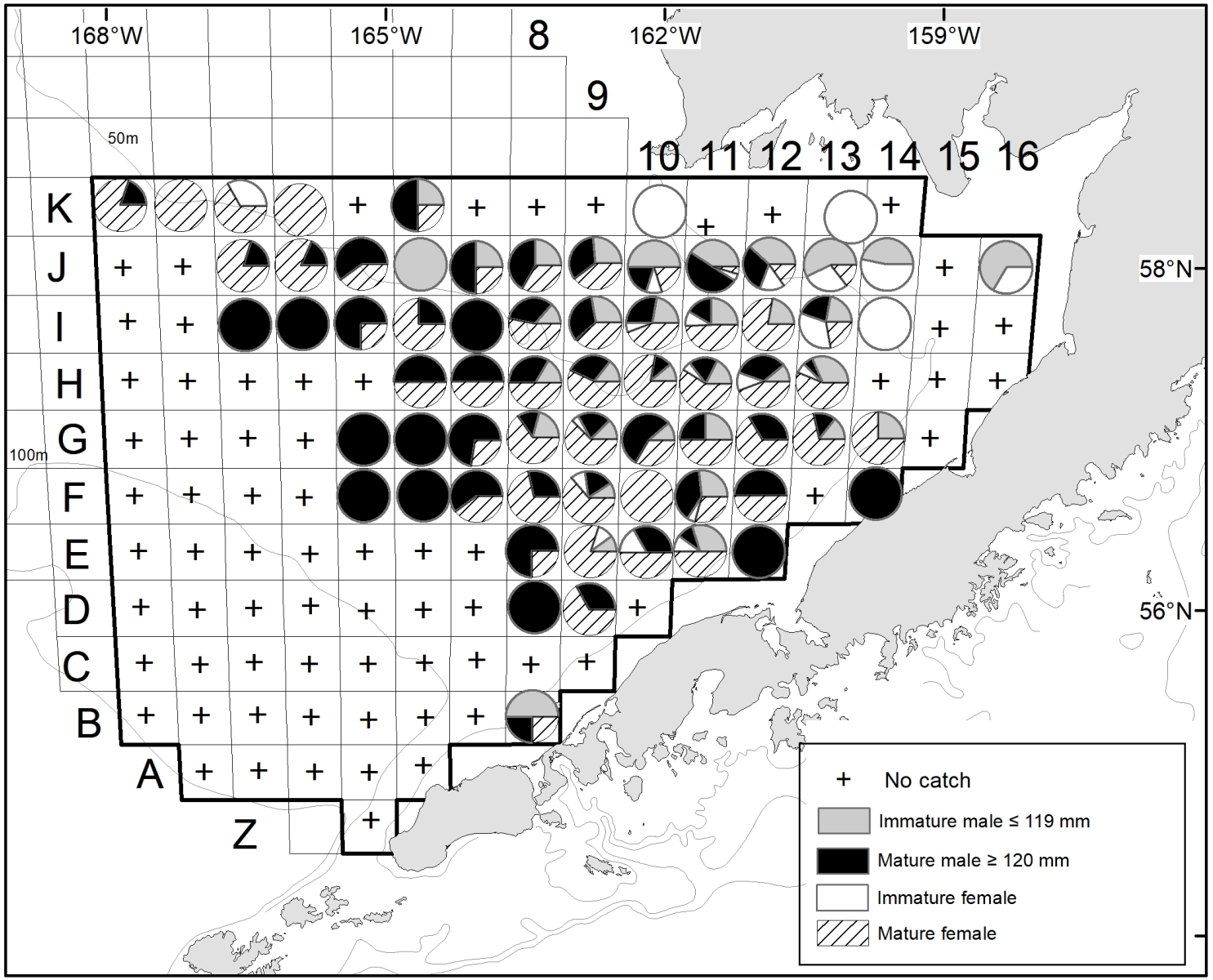


Figure 16. -- Proportion of male and female red king crab (*Paralithodes camtschaticus*) maturity classes caught at each station sampled in 2019 in the Bristol Bay District. Outlined area depicts the management.

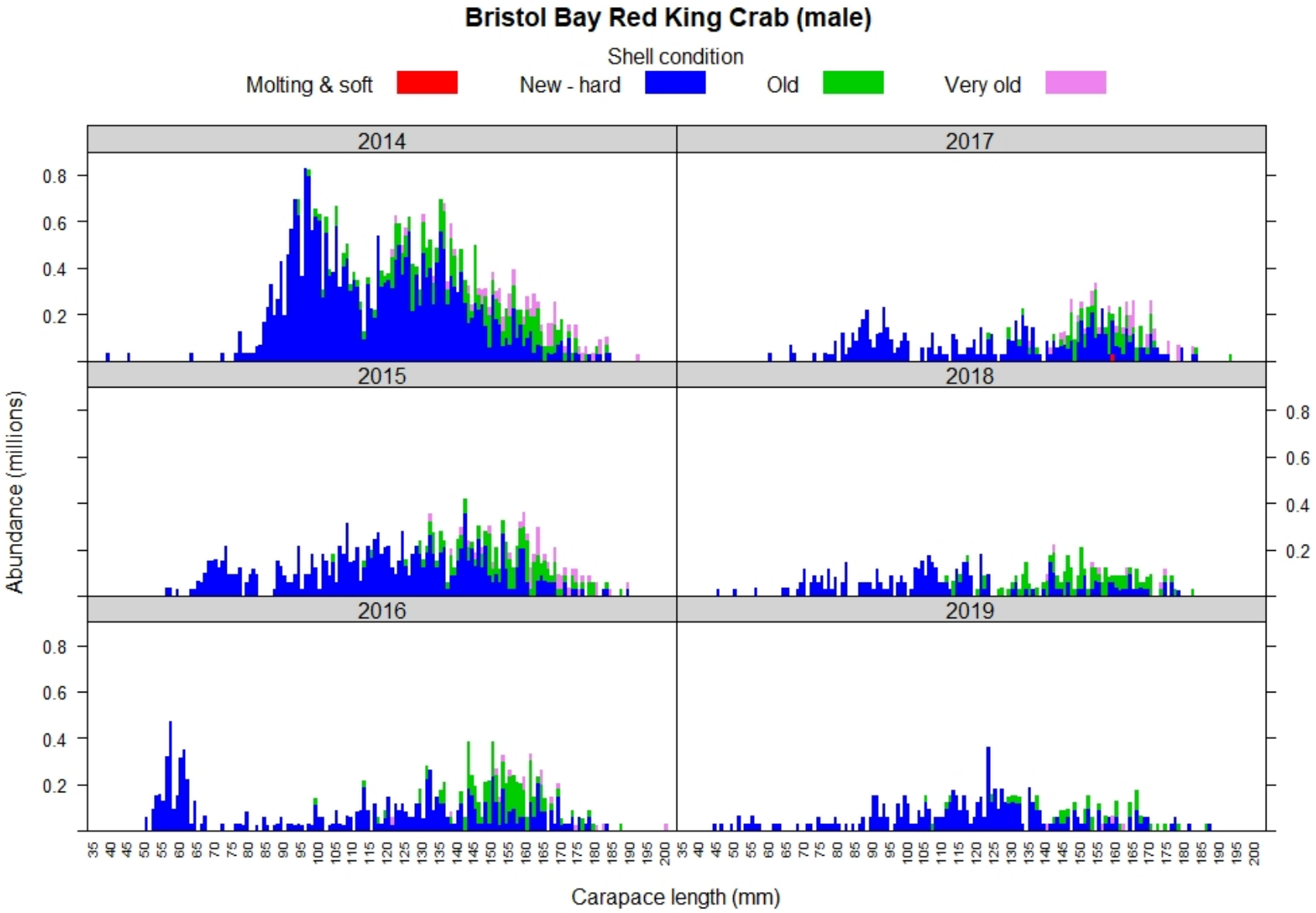


Figure 17. – Abundance (millions) by size and shell condition of Bristol Bay District male red king crab (*Paralithodes camtschaticus*) using 1 mm length classes, 2014-2019.

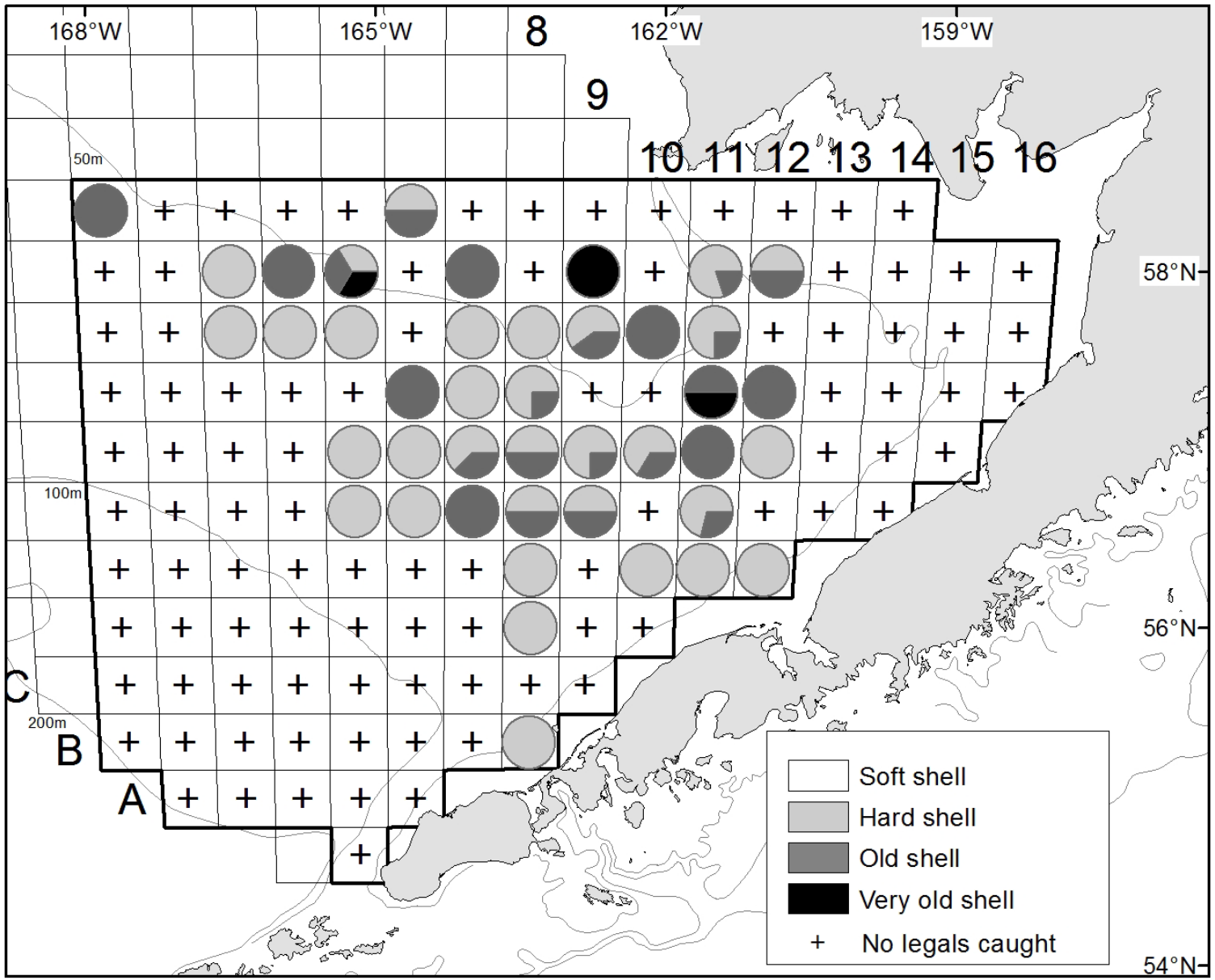


Figure 18a. -- Proportion of legal-sized, male red king crab (*Paralithodes camtschaticus*) shell condition classes caught at each station sampled in 2019 in the Bristol Bay District. The outlined area depicts management district.

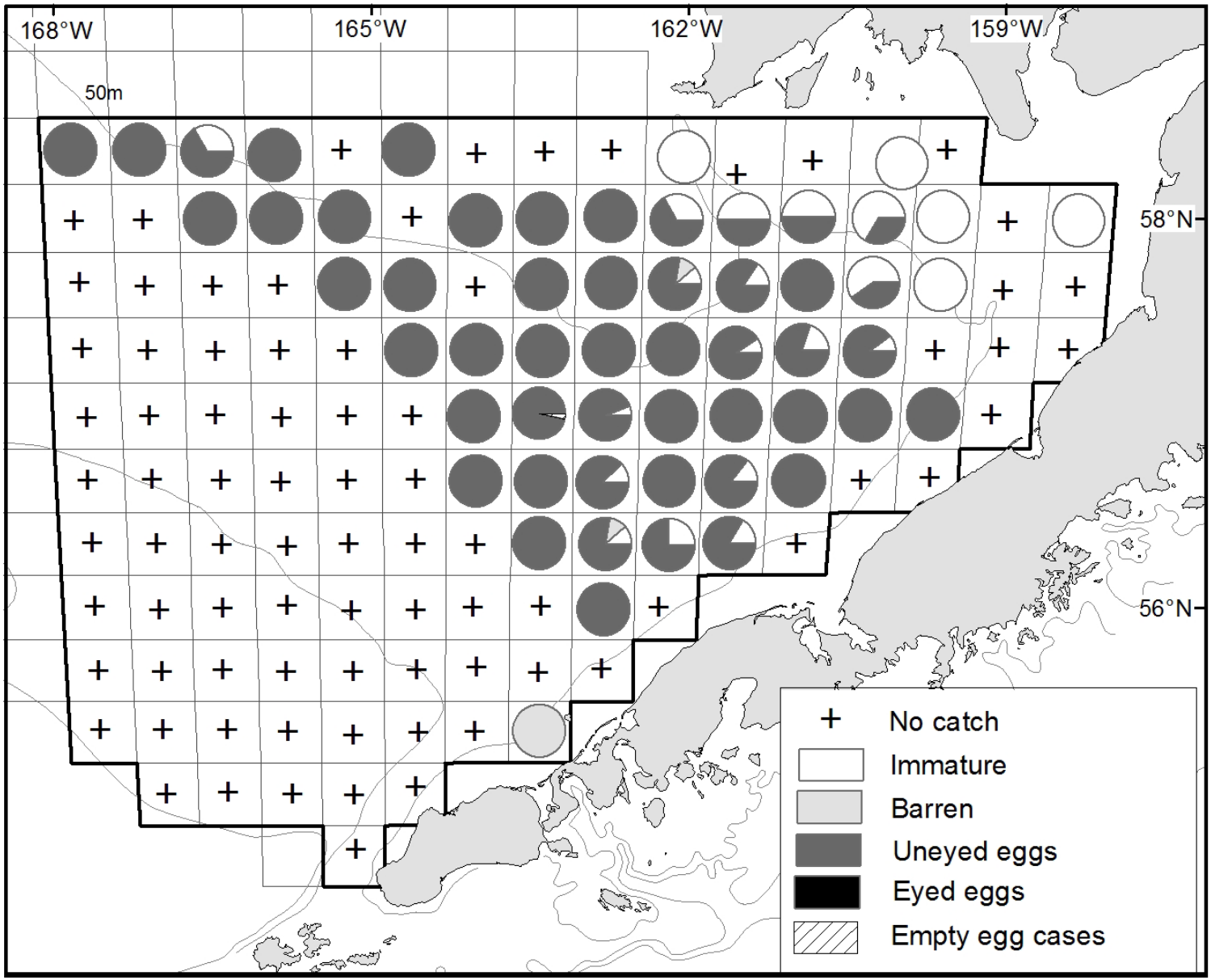


Figure 18b. -- Proportion of female red king crab (*Paralithodes camtschaticus)* egg condition classes caught at each station sampled in 2019 in the Bristol Bay District. The outlined area depicts management district.

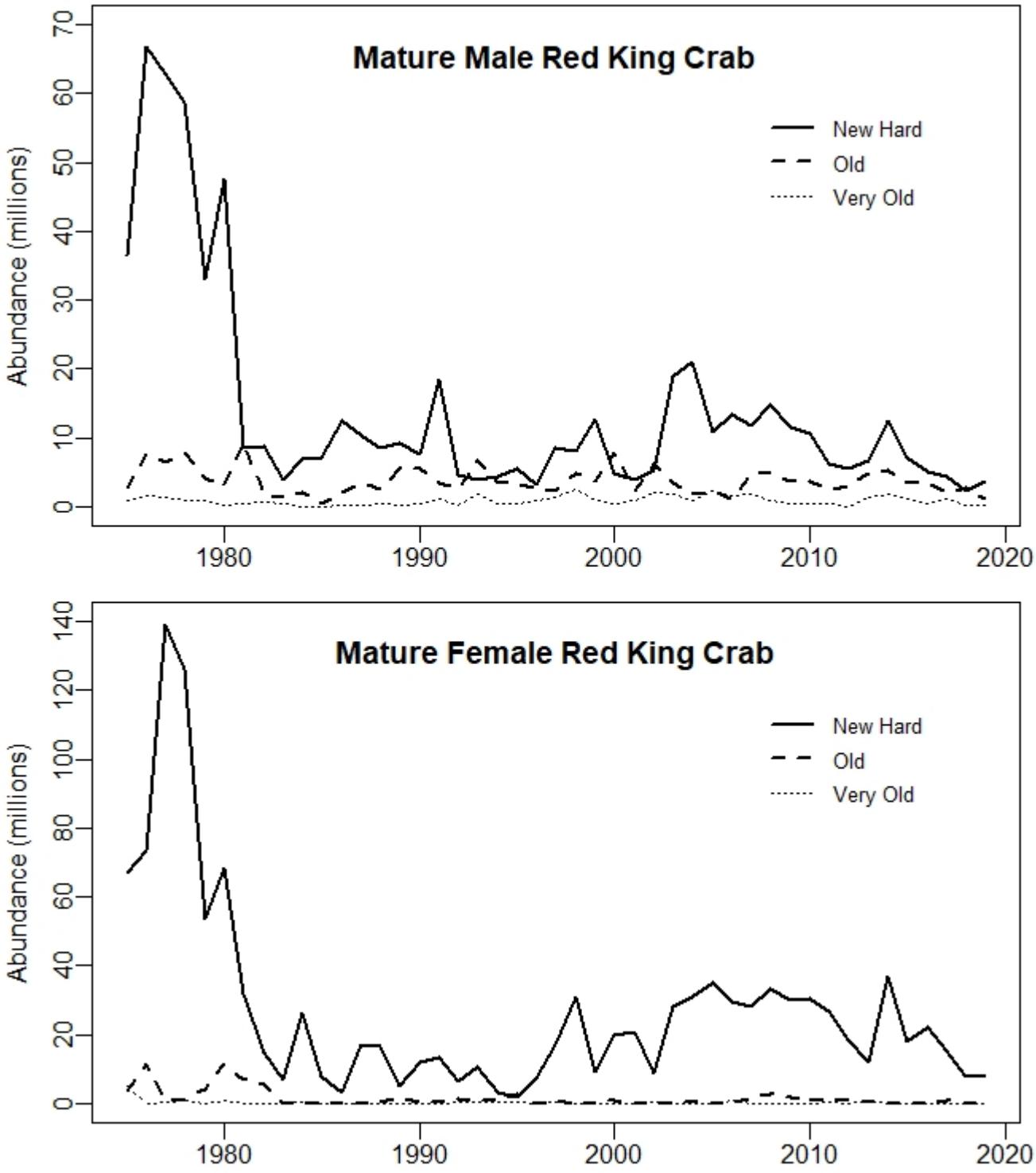


Figure 19. -- Time series of mature male (≥120 mm CL) and female (actual maturity) Bristol Bay District red king crab (*Paralithodes camtschaticus*) abundance by shell condition, 1975-2019. New-Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

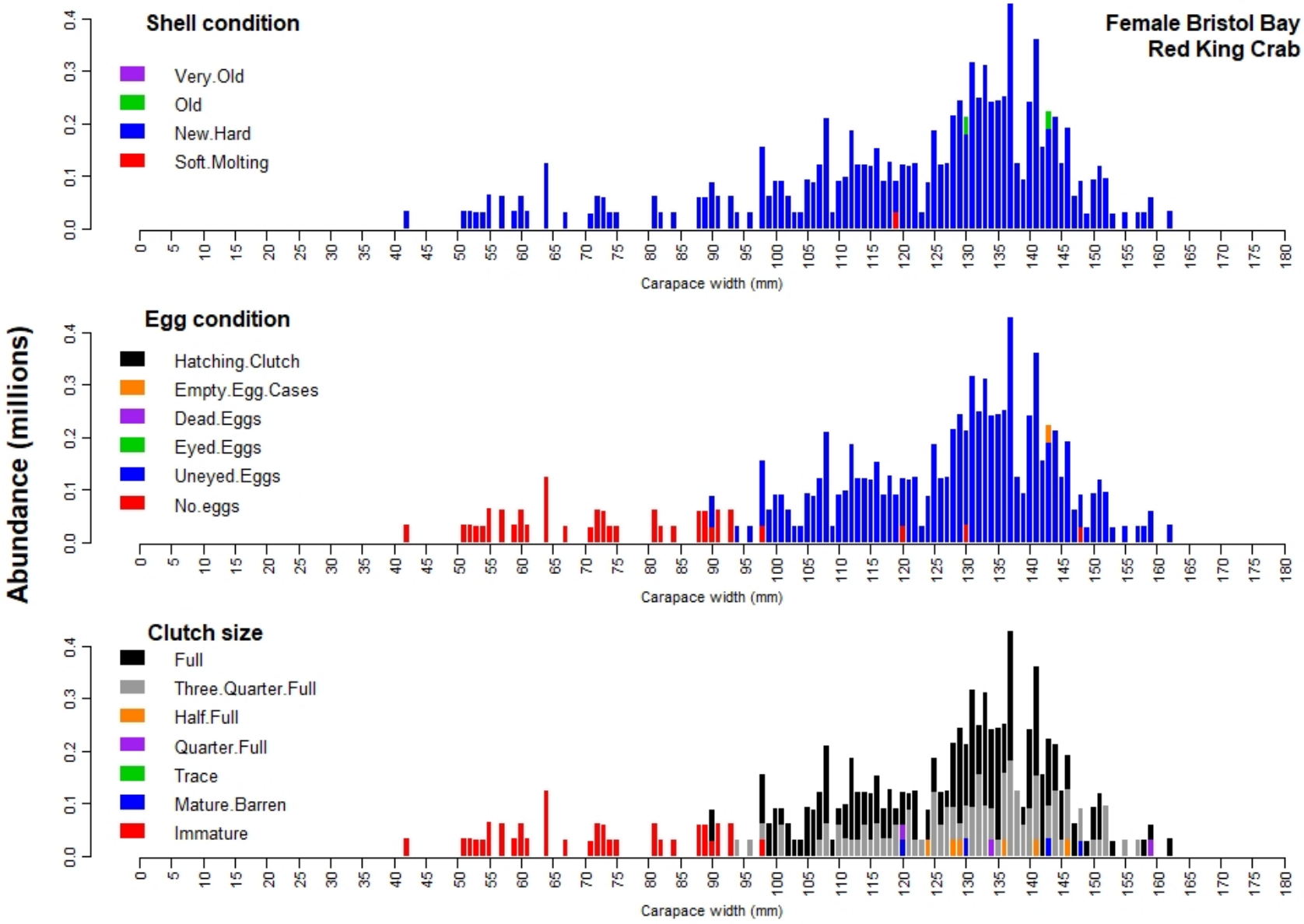


Figure 20. -- Size frequency by shell condition, egg condition, and clutch fullness of Bristol Bay District female red king crab (*Paralithodes camtschaticus*) by 1 mm length classes in 2019.

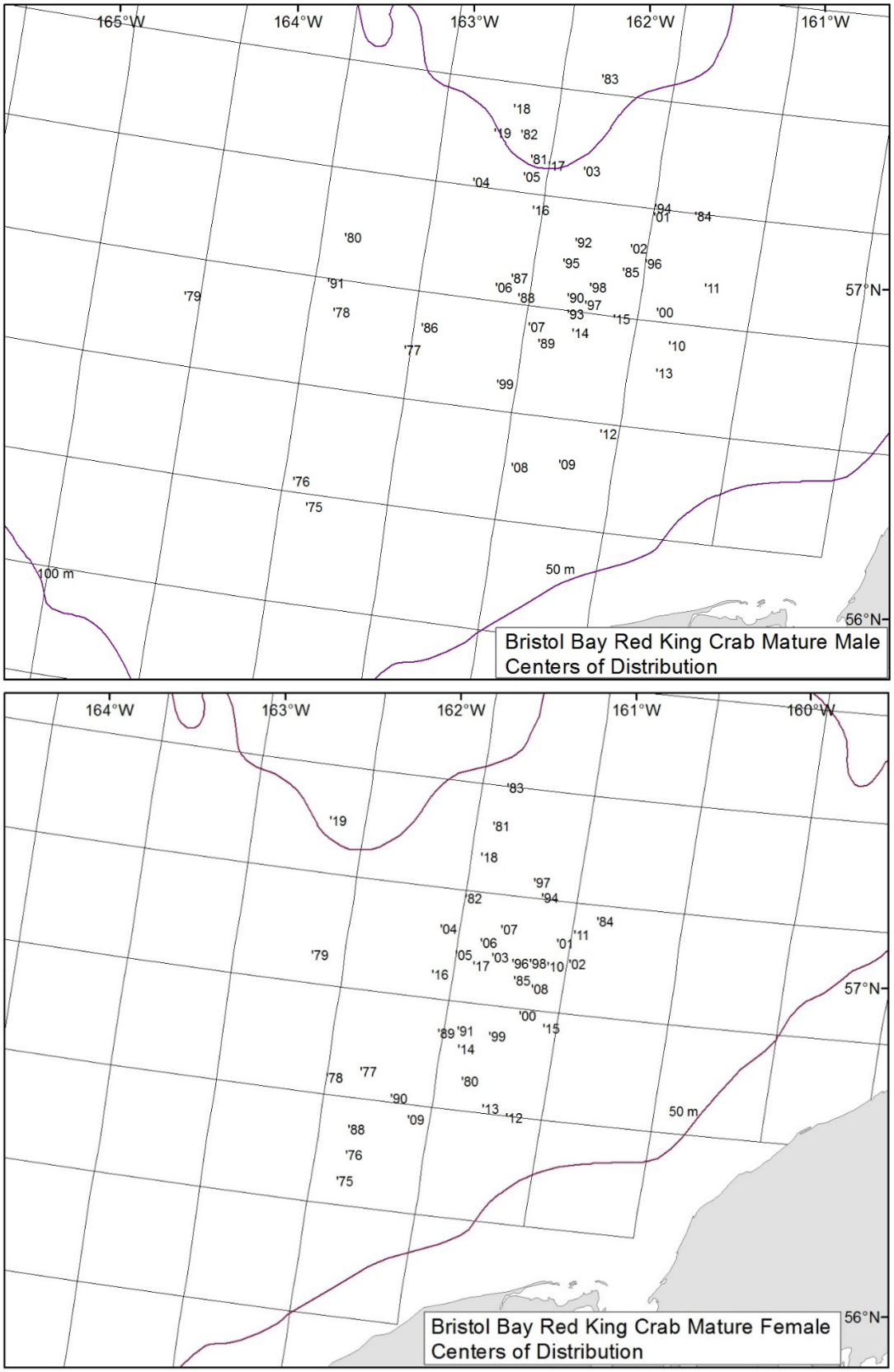


Figure 21. -- Centers of stock distribution of Bristol Bay District mature male (top) and female (bottom) red king crab (*Paralithodes camtschaticus*) from 1975 to 2019.

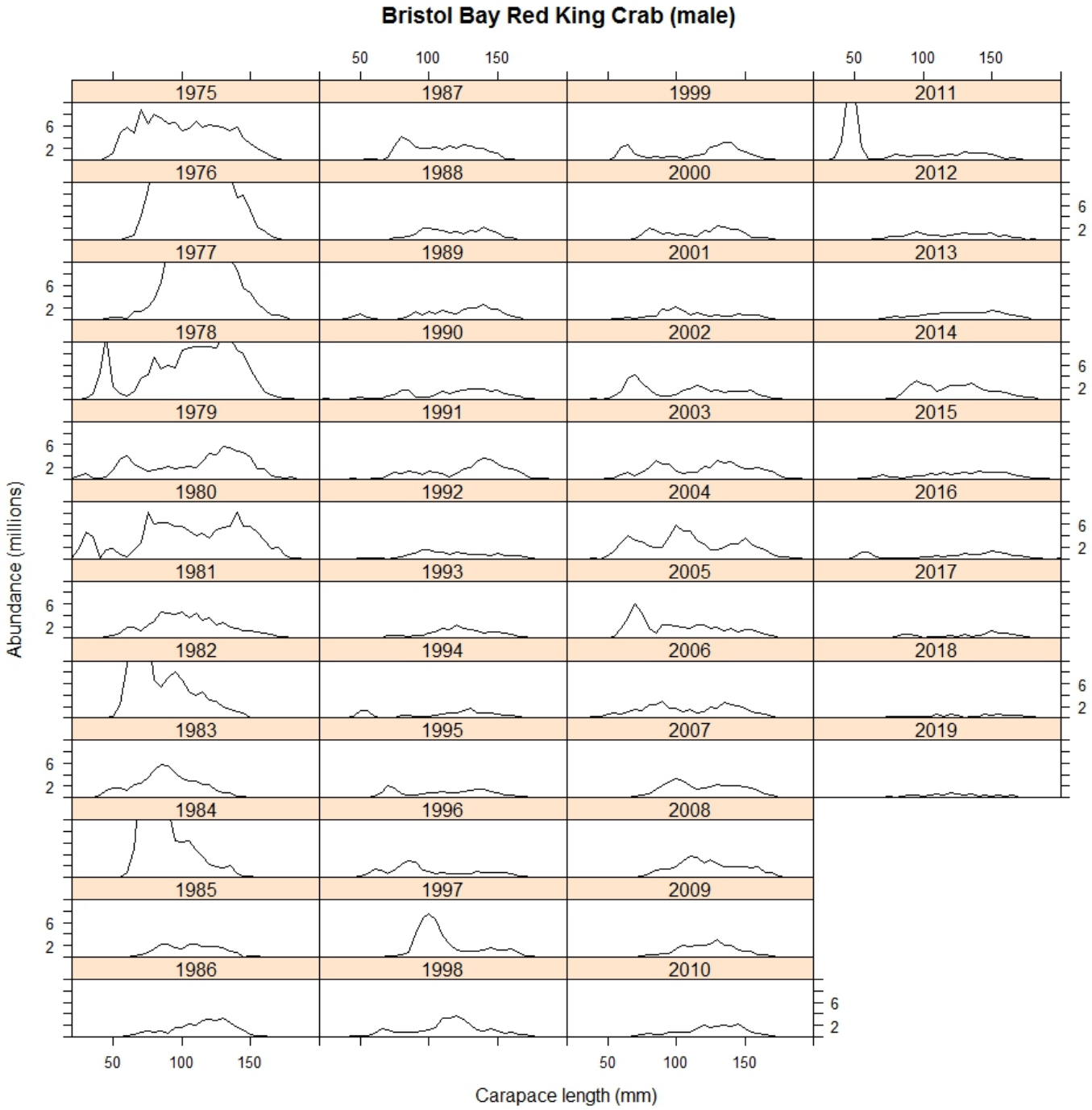


Figure 22. -- Historical size frequency by 5 mm length classes of Bristol Bay District male red king crab (*Paralithodes camtschaticus*), 1975 to 2019.

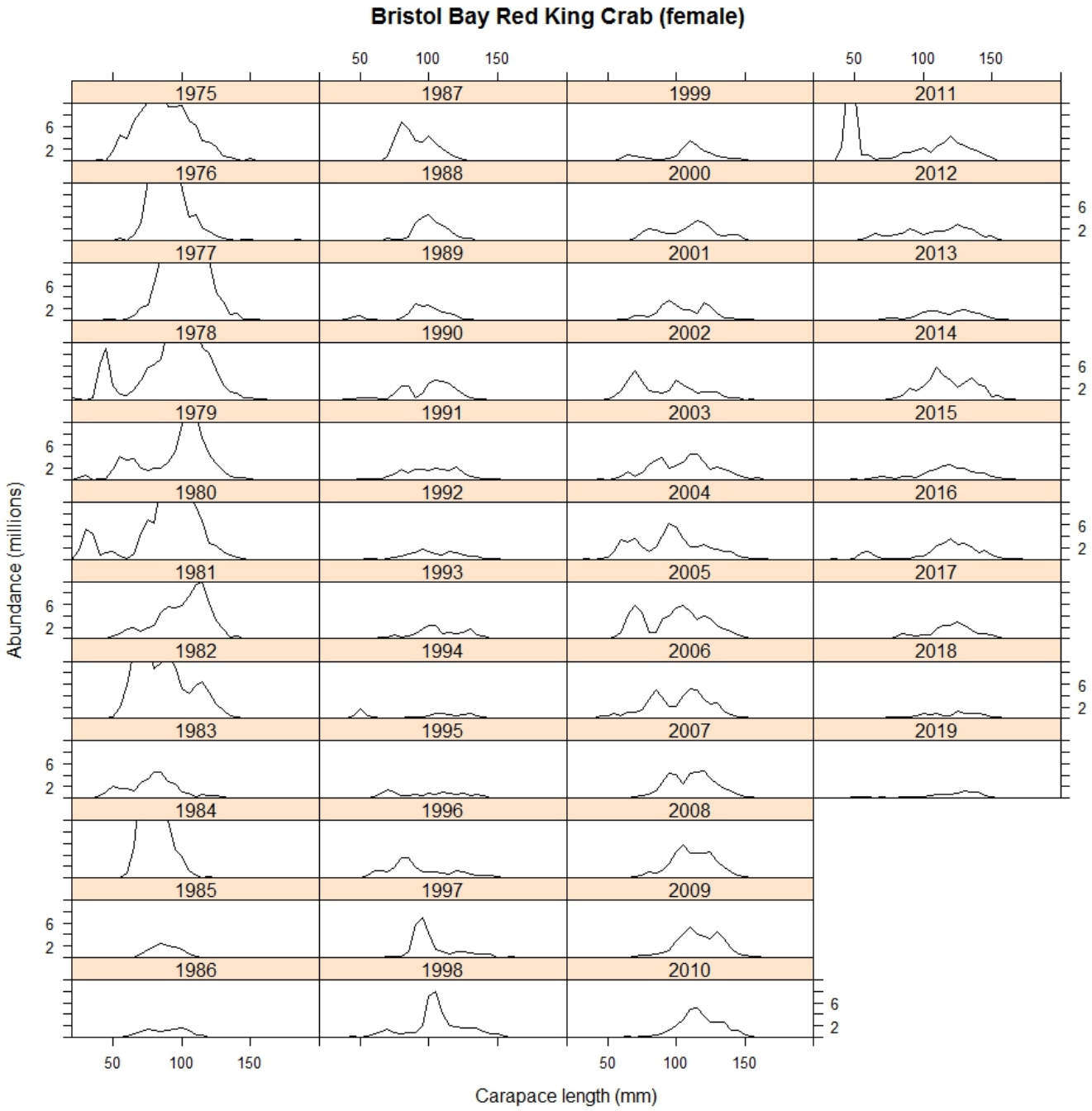


Figure 23. -- Historical size frequency by 5 mm length classes of Bristol Bay District female red king crab (*Paralithodes camtschaticus*), 1975 to 2019.

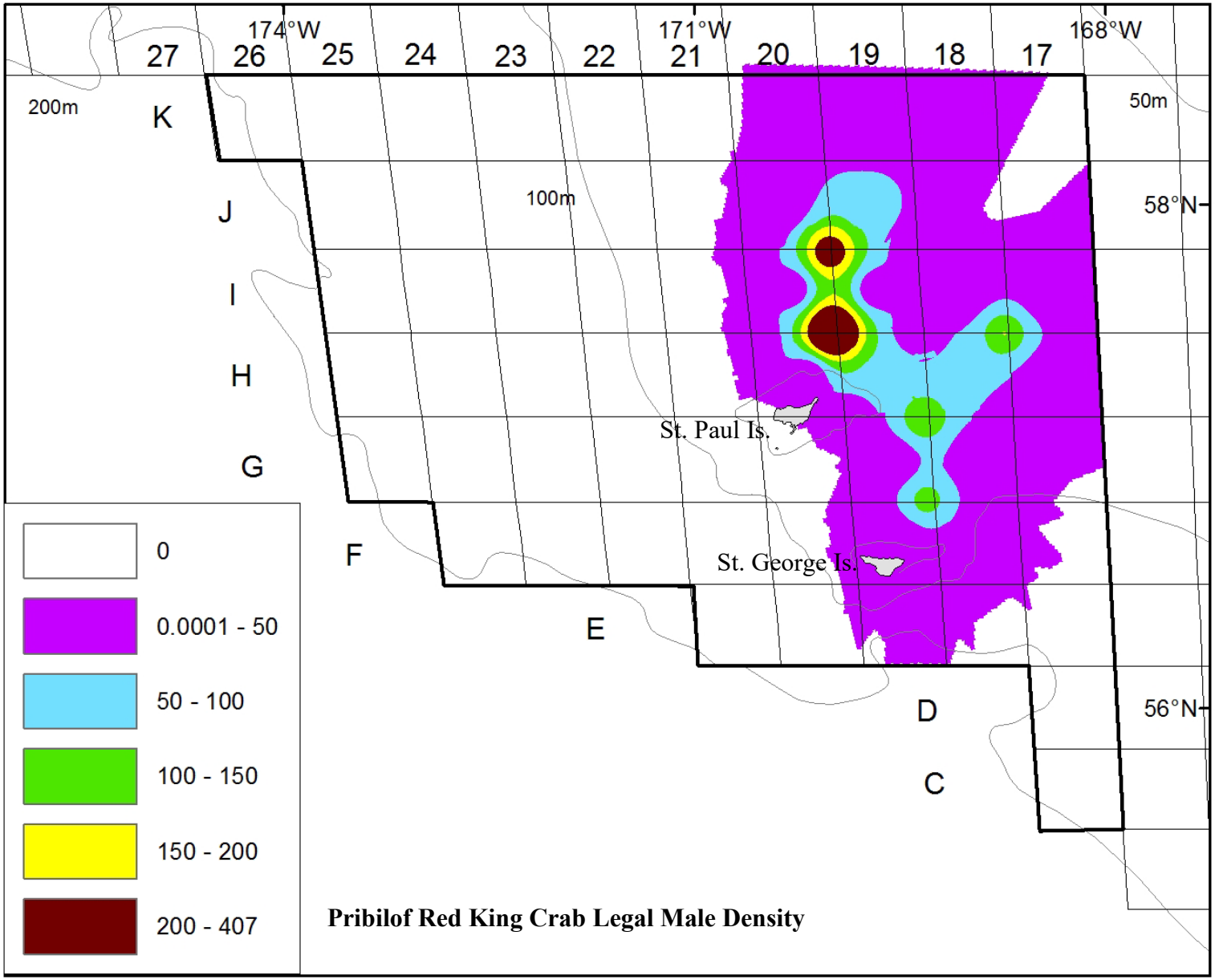


Figure 24. -- Estimated total density (number nmi^{-2}) of legal-sized male red king crab (*Paralithodes camtschaticus*) at each station sampled in the Pribilof District in 2019. The outlined area depicts stations within the management district.

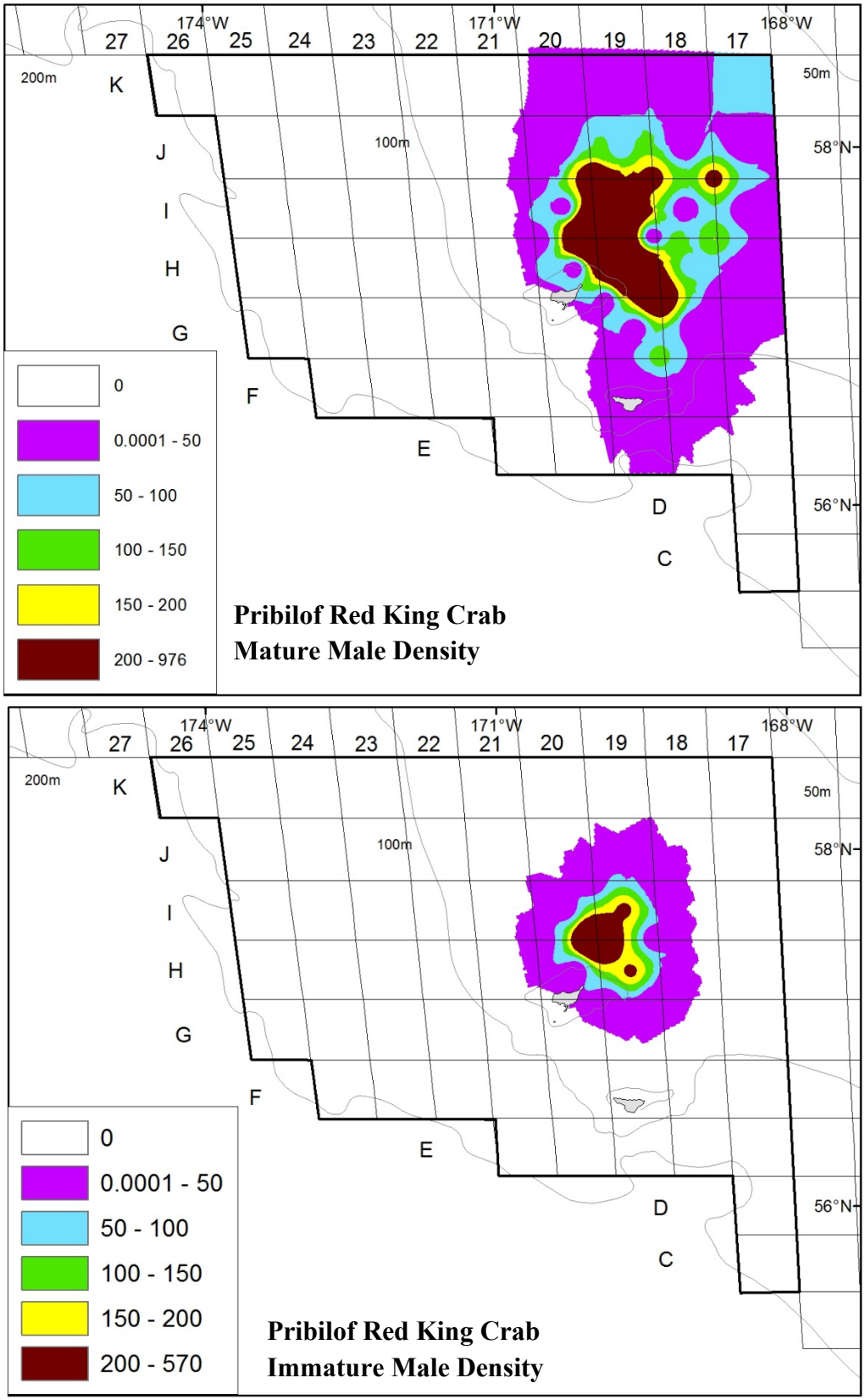


Figure 25. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the Pribilof District in 2019. The outlined area depicts stations within the management district.

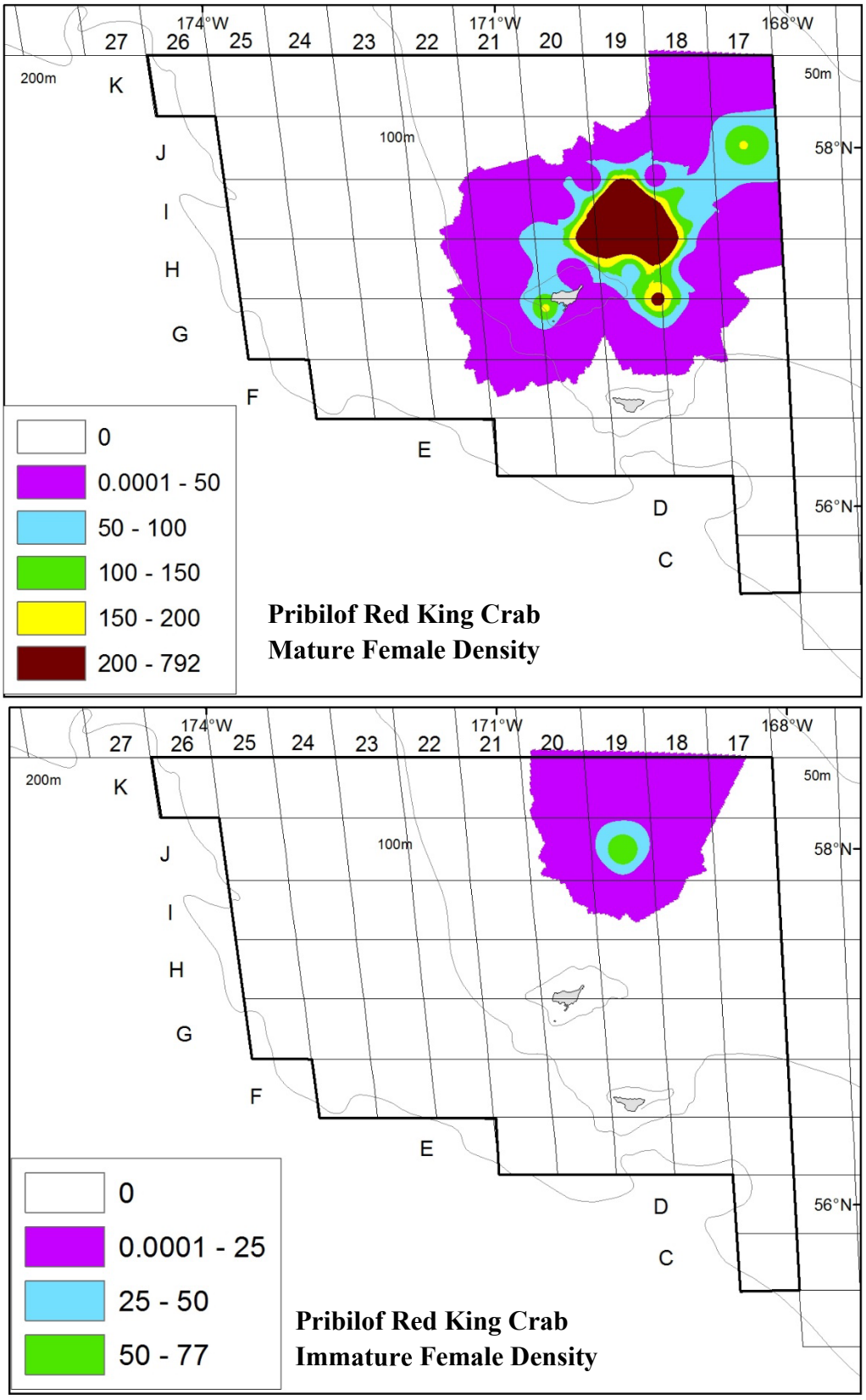


Figure 26. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the Pribilof District in 2019. The outlined area depicts stations within the management district.

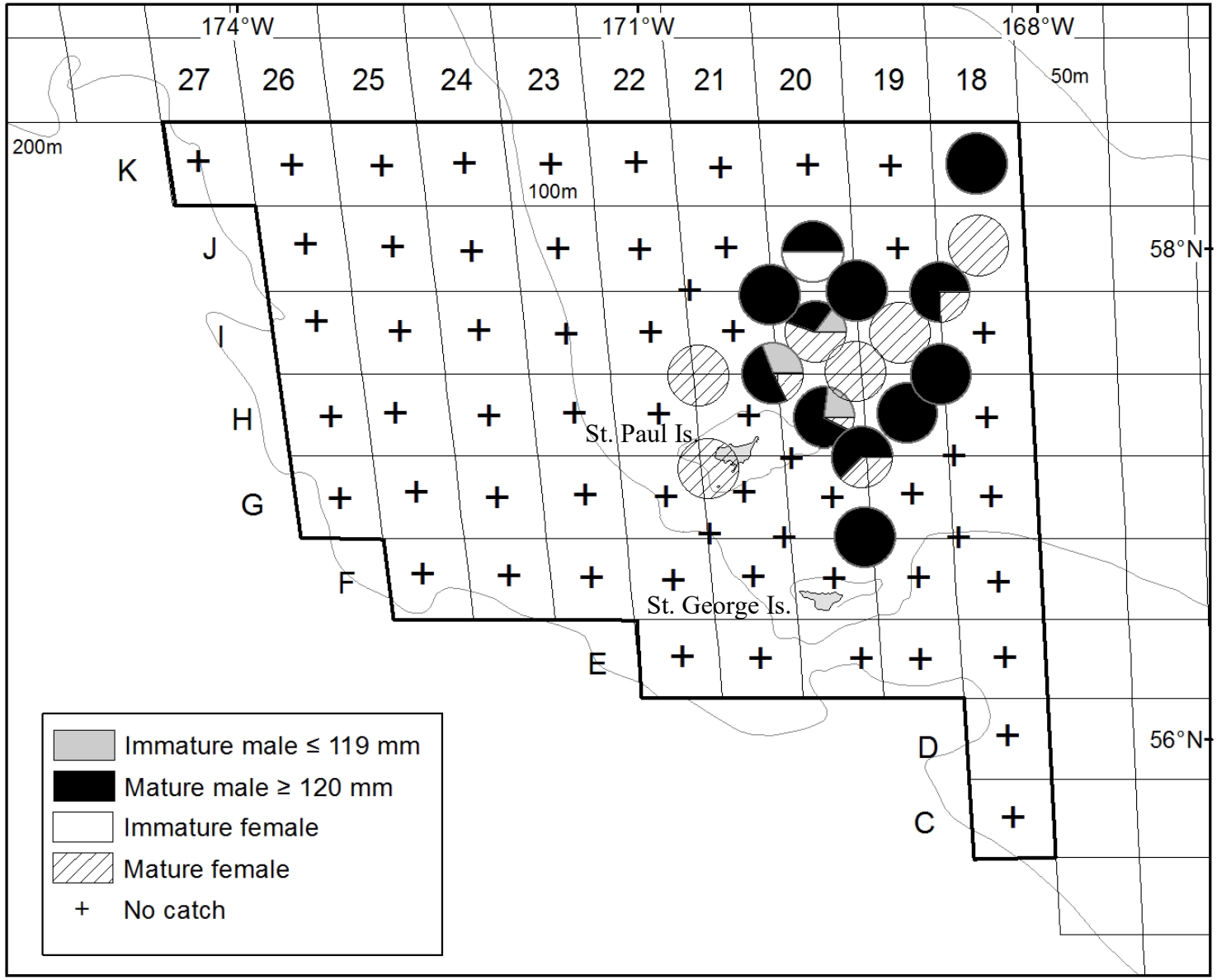


Figure 27. -- Proportion of male and female red king crab (*Paralithodes camtschaticus*) maturity classes caught at each station sampled in 2019 in the Pribilof District. The outlined area depicts stations within the management district.

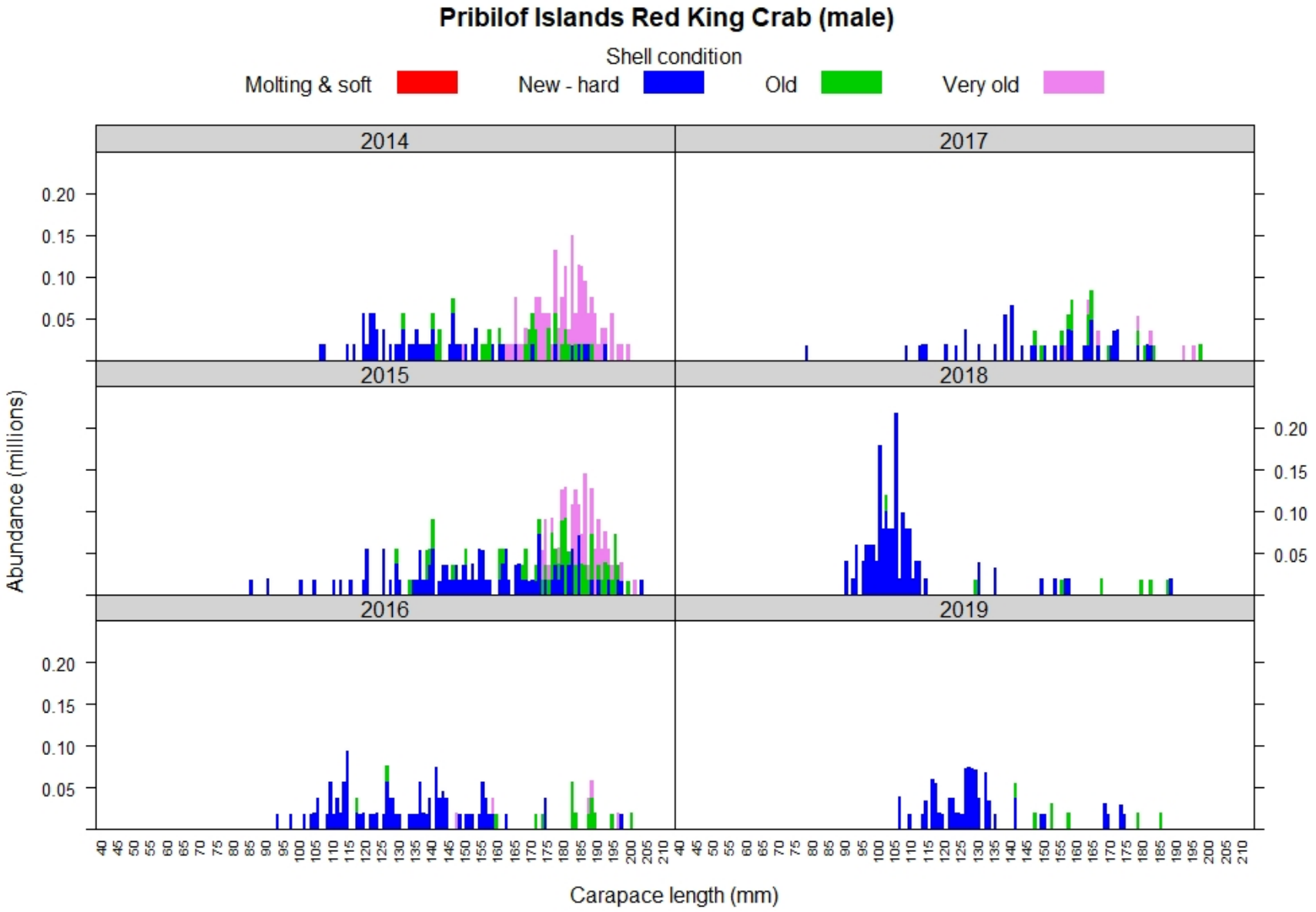


Figure 28. -- Abundance (millions) by size and shell condition of Pribilof District male red king crab (*Paralithodes camtschaticus*) using 1 mm length classes, 2014-2019.

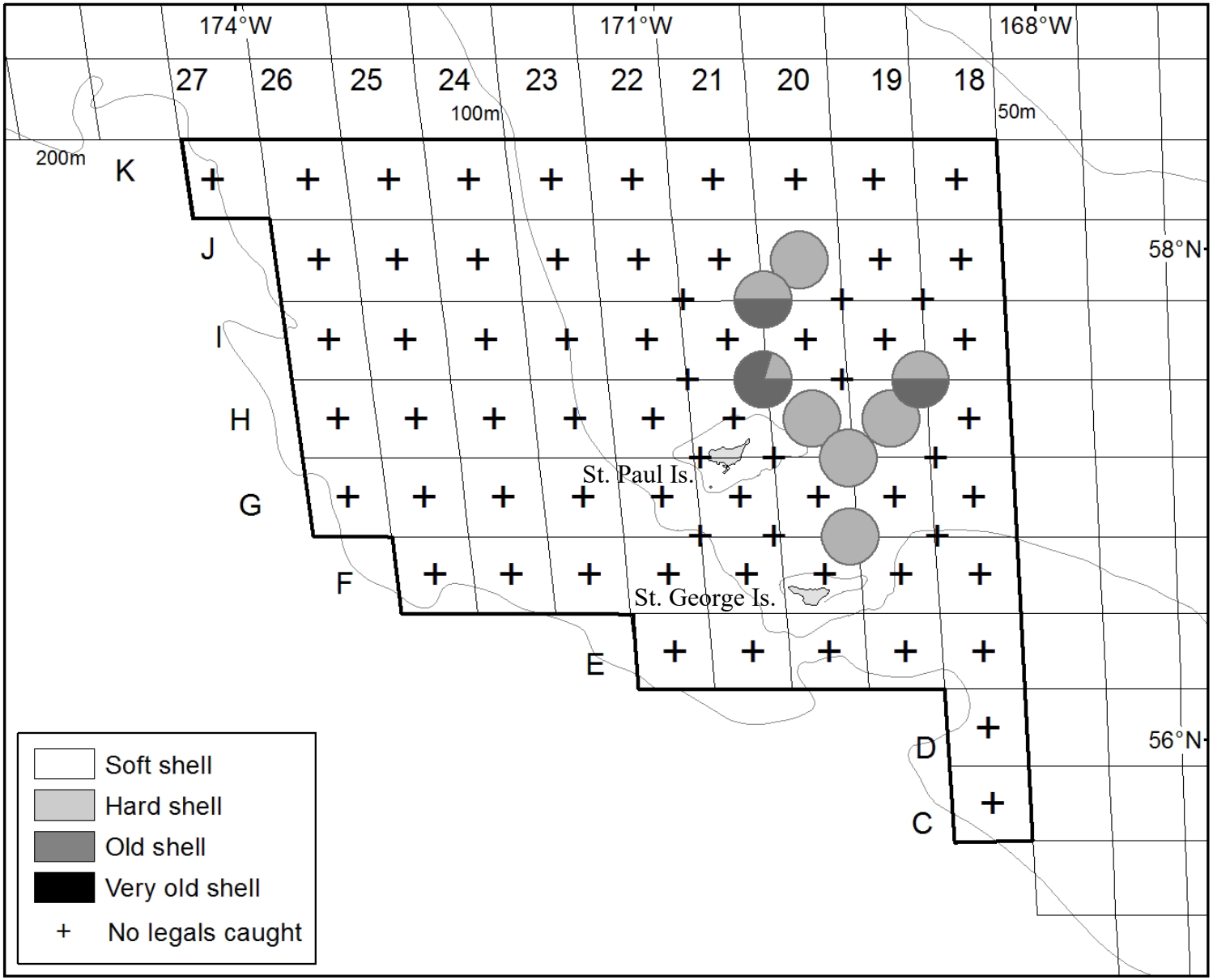


Figure 29. -- Proportion of legal-sized, male red king crab (*Paralithodes camtschaticus*) shell condition classes caught at each station sampled in 2019 in the Pribilof District. The outlined area depicts stations within the management district.

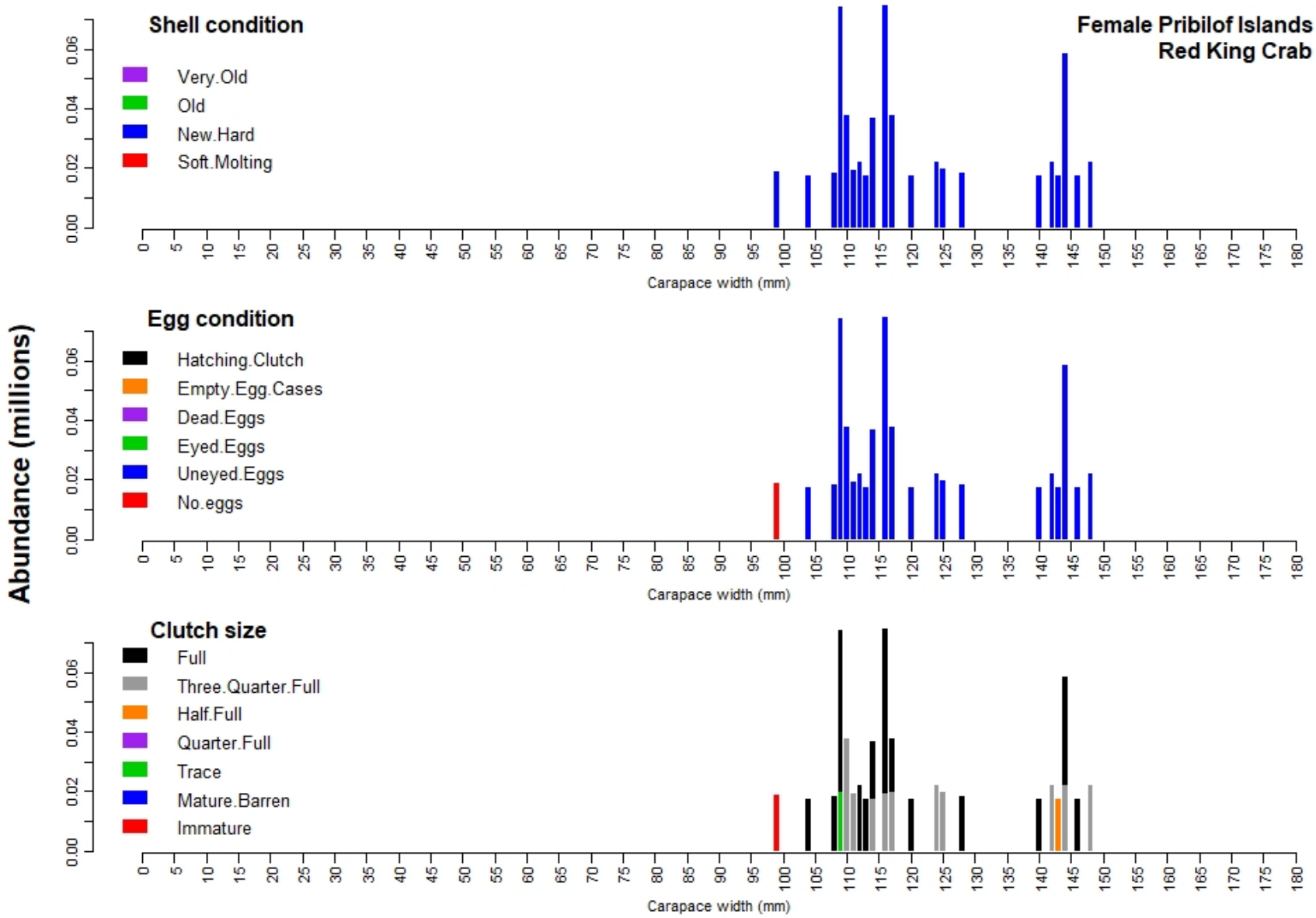


Figure 30. -- Size frequency by shell condition, egg condition, and clutch fullness of Pribilof District female red king crab (*Paralithodes camtschaticus*) by 1 mm length classes in 2019.

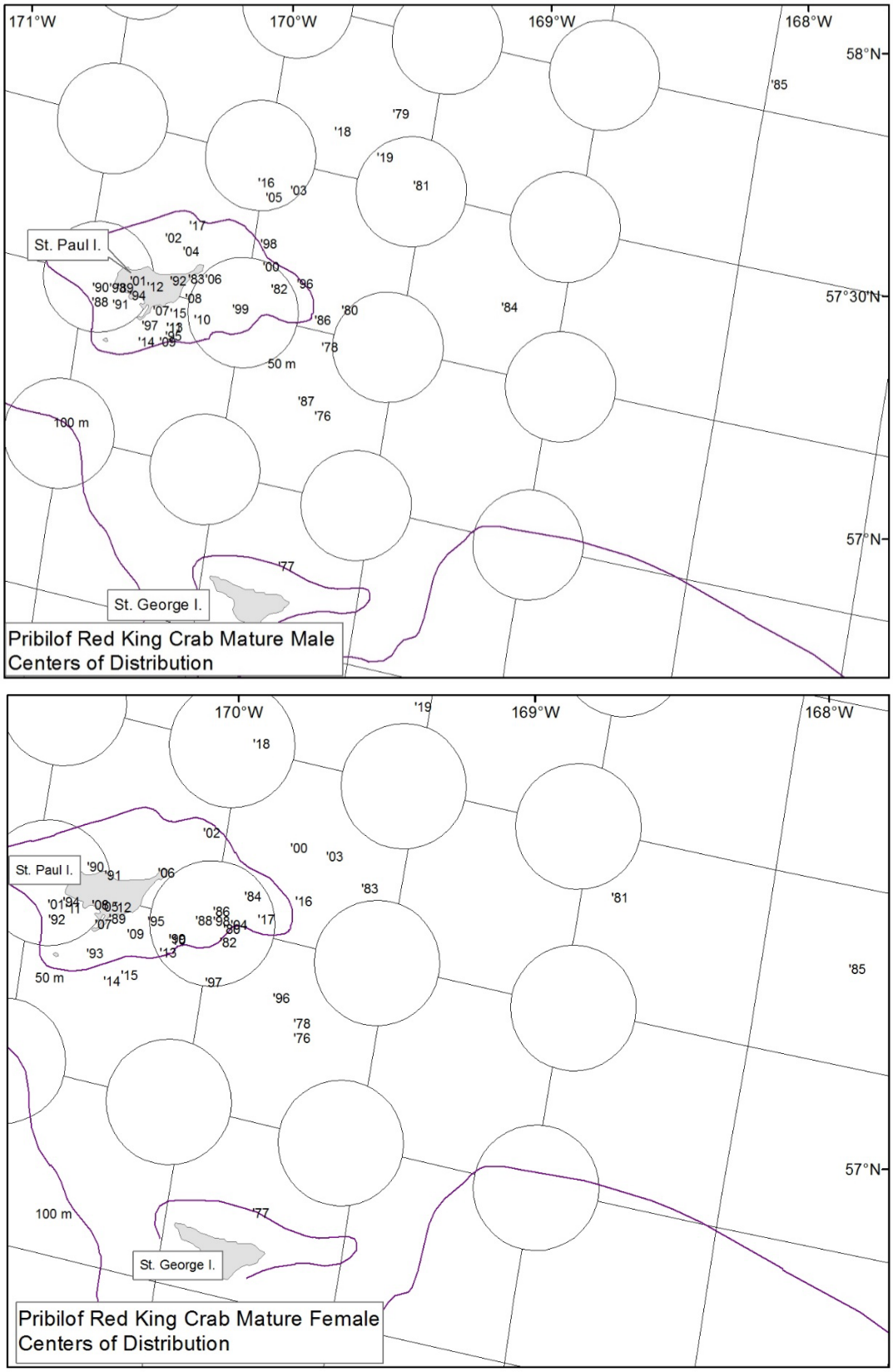


Figure 31. -- Centers of stock distribution of Pribilof Islands mature male (top) and female (bottom) red king crab (*Paralithodes camtschaticus*) from 1975 to 2019.

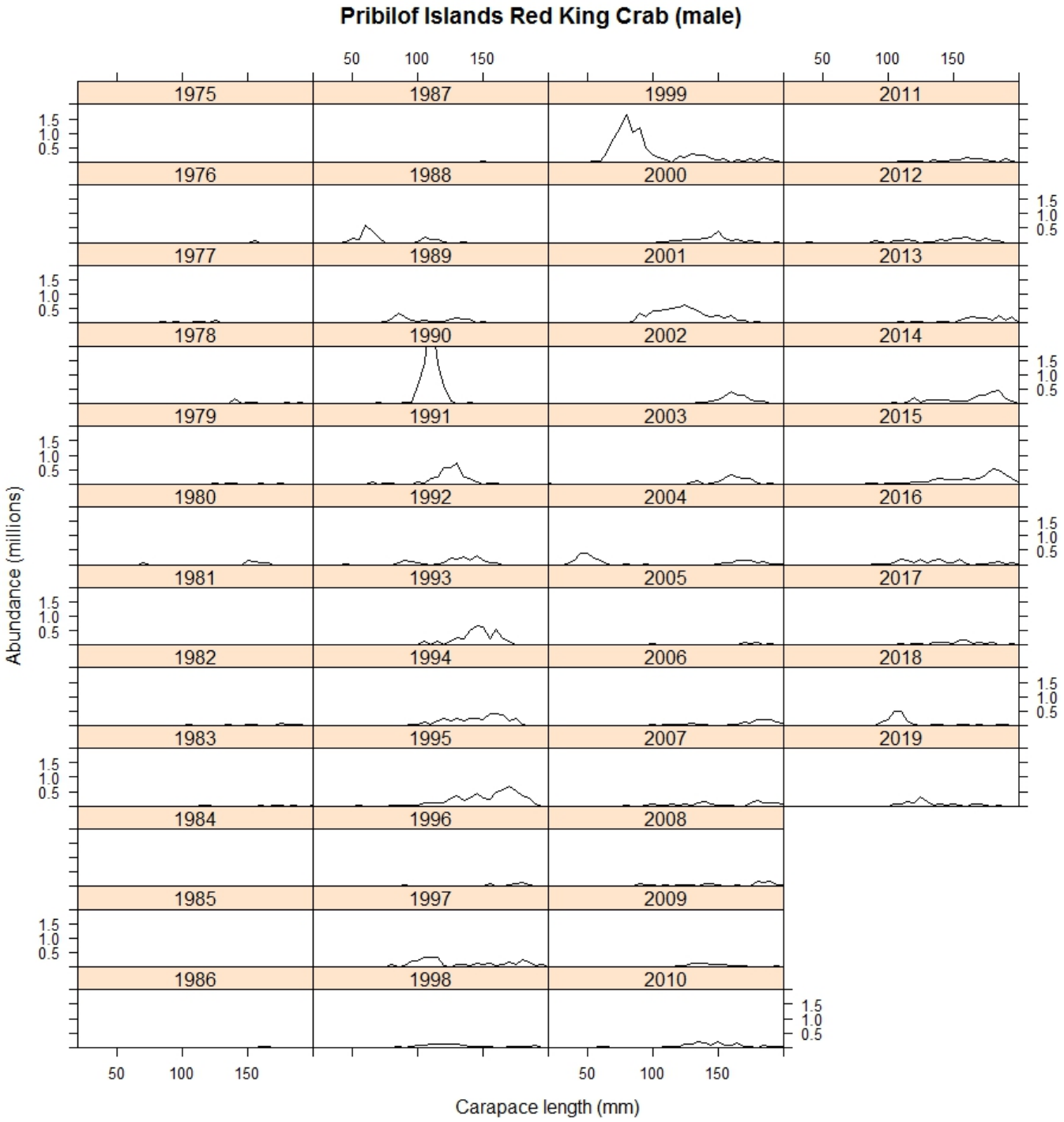


Figure 32. -- Size frequency by 5 mm length classes of Pribilof Islands male red king crab (*Paralithodes camtschaticus*) from 1975 to 2019.

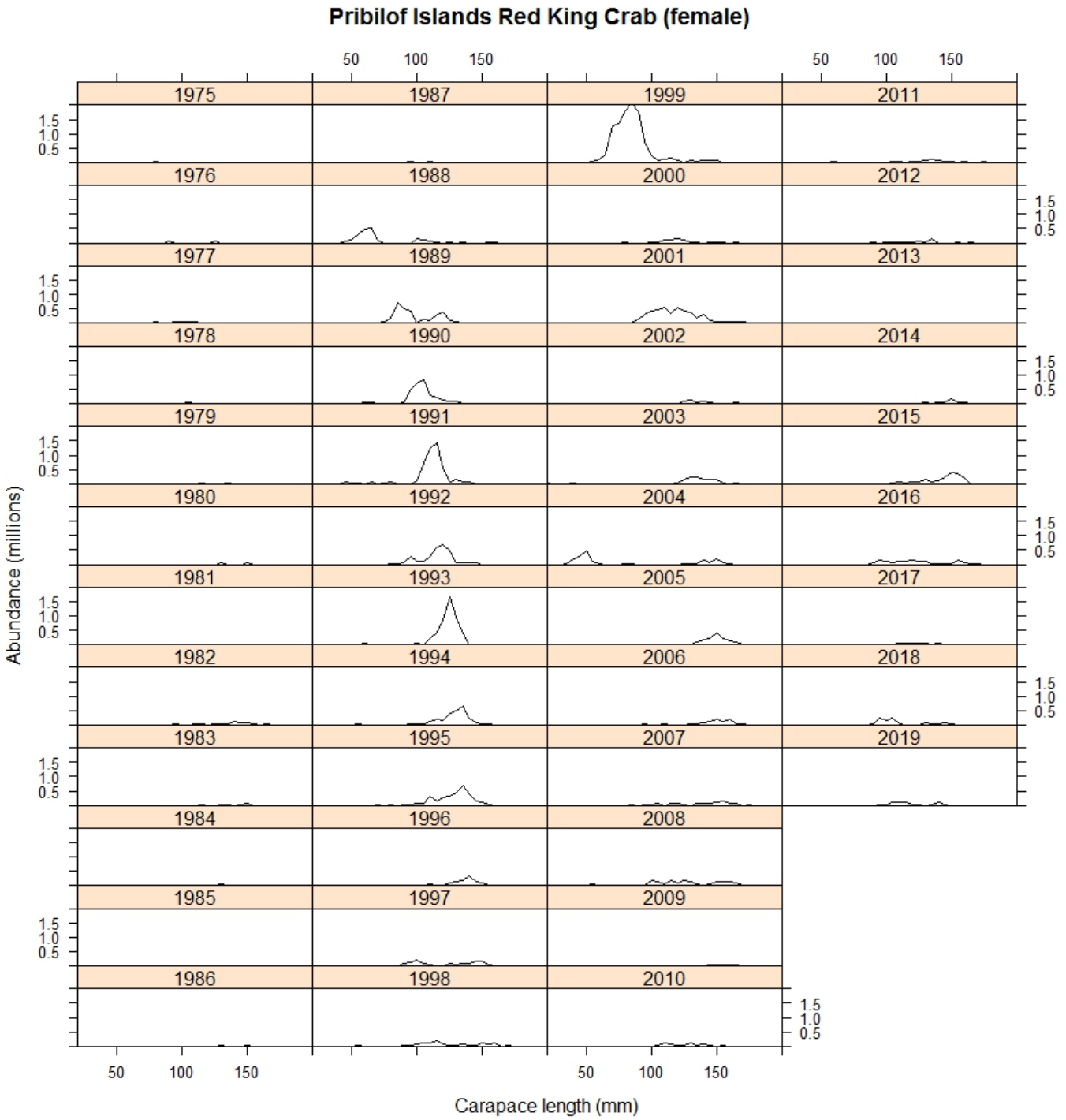


Figure 33. -- Size frequency by 5 mm length classes of Pribilof Islands female red king crab (*Paralithodes camtschaticus*) from 1975 to 2019.

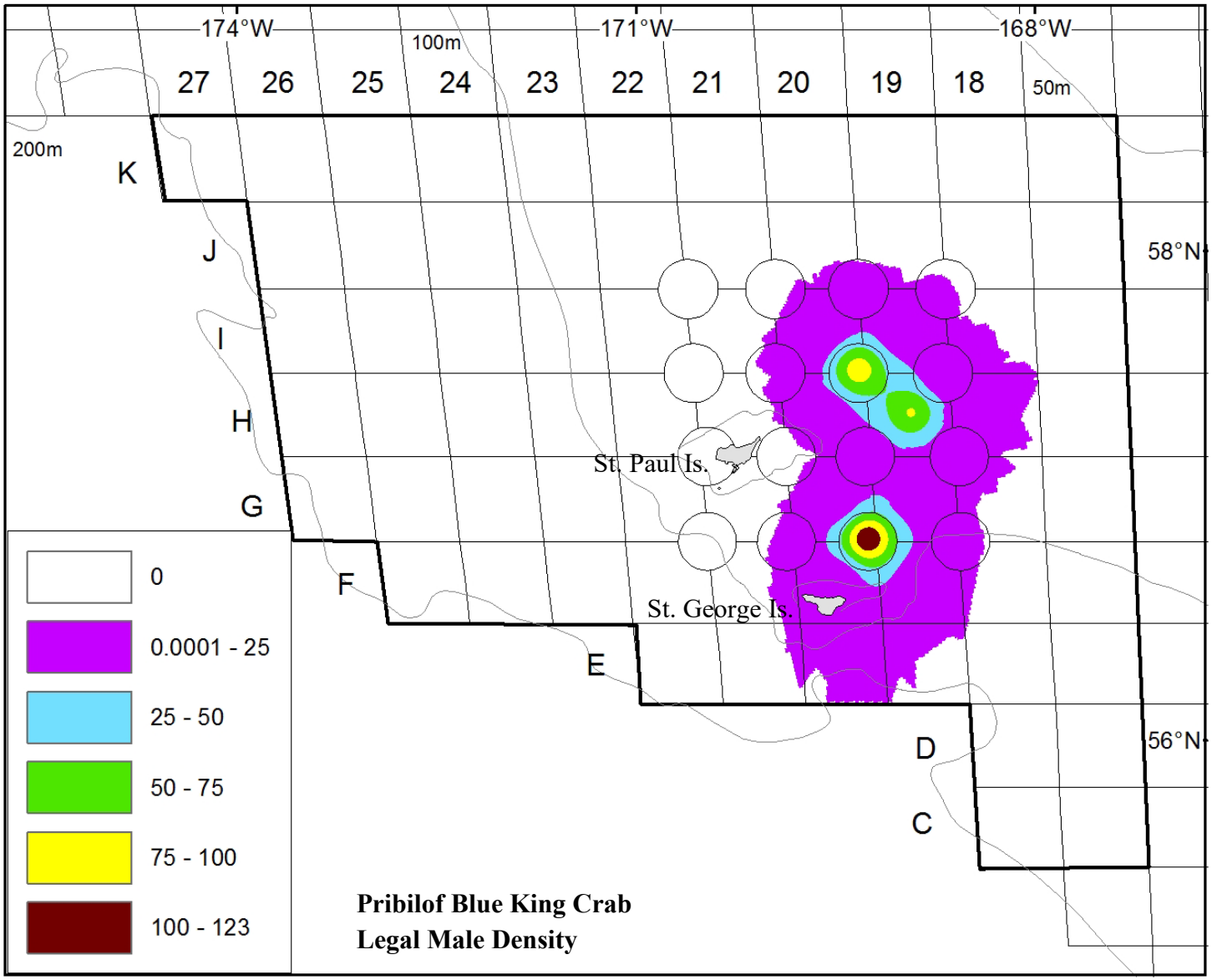


Figure 34. -- Estimated total density (number nmi^{-2}) of legal-sized male blue king crab (*Paralithodes platypus*) at each station sampled in the Pribilof District in 2019. The outlined area depicts the management district as defined by ADF&G.

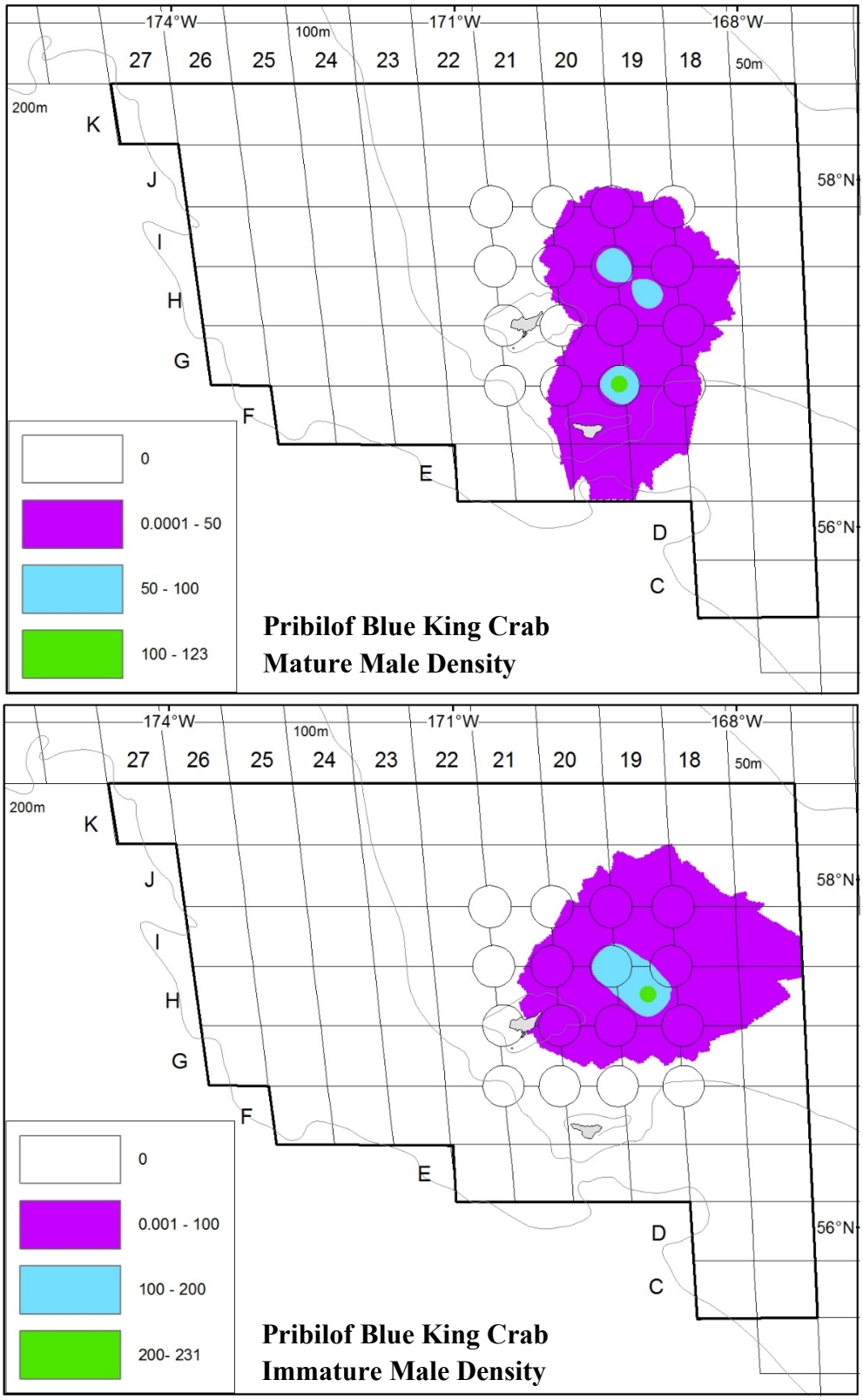


Figure 35. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the Pribilof District in 2019. The outlined area depicts the management district as defined by ADF&G.

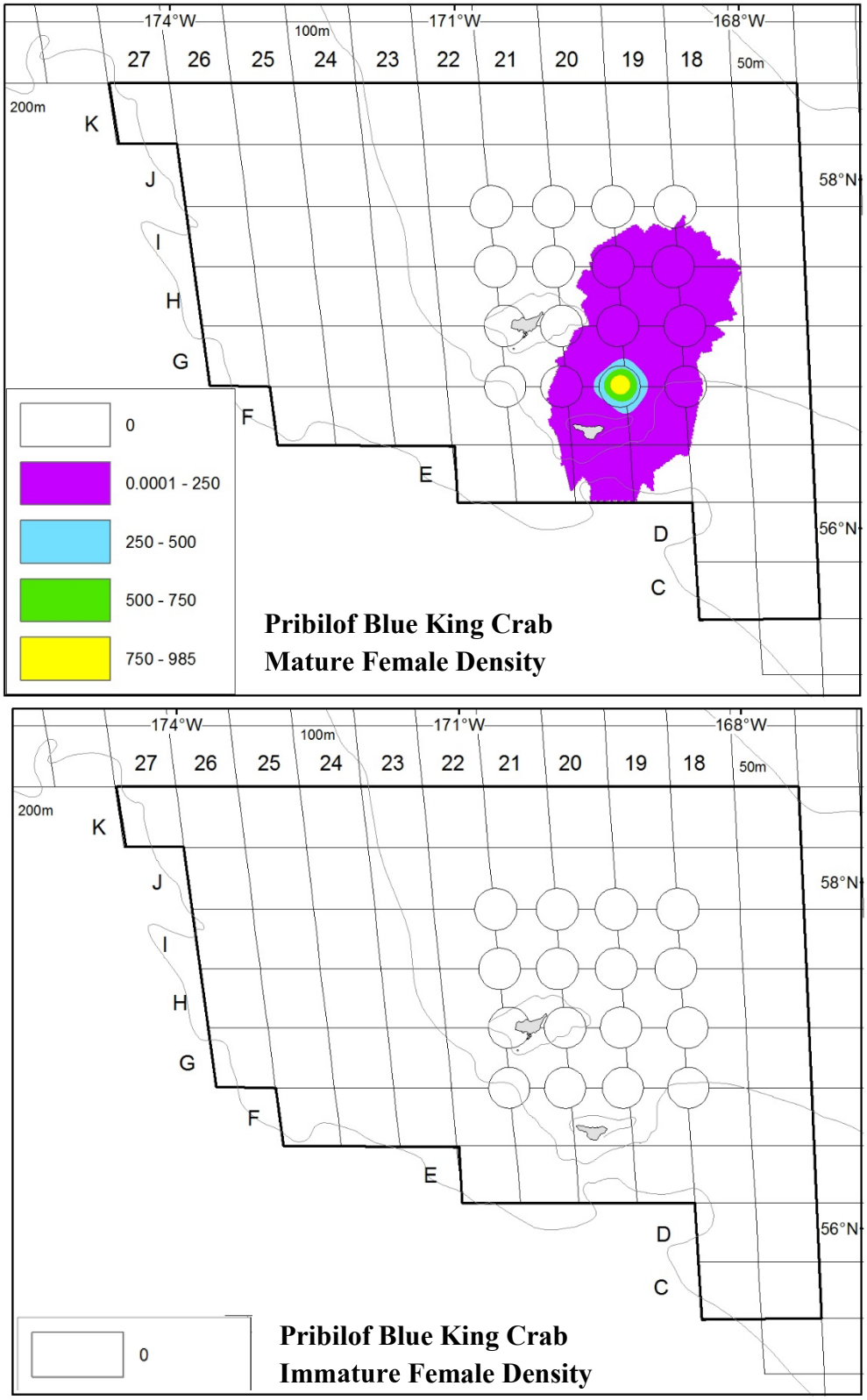


Figure 36. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the Pribilof District in 2019. The outlined area depicts the management district as defined by ADF&G. Note that there were no immature female blue king crab caught in 2019.

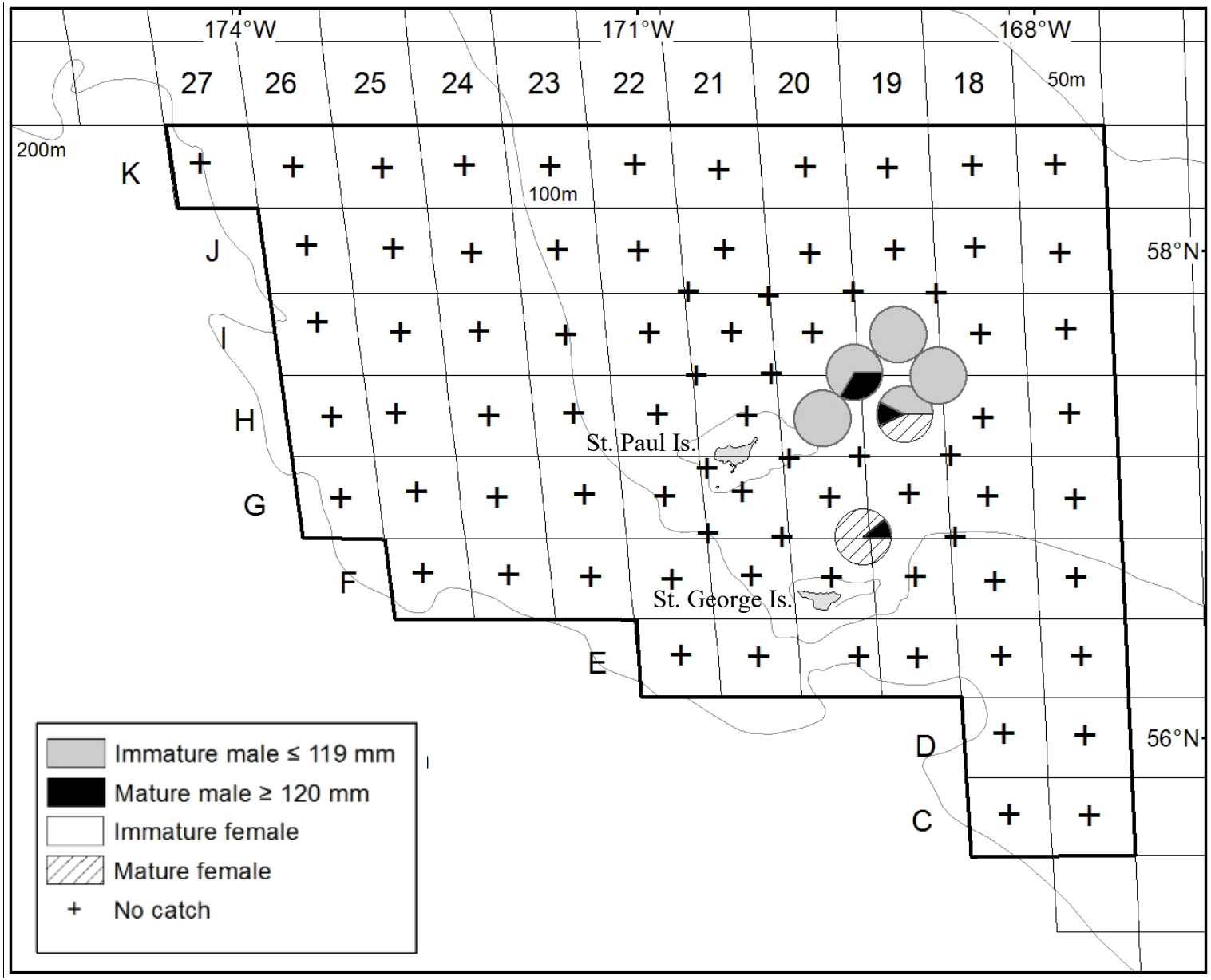


Figure 37. -- Proportion of male and female blue king crab (*Paralithodes platypus*) maturity classes caught at each station sampled in 2019 in the Pribilof District. The outlined area depicts the management district as defined by ADF&G.

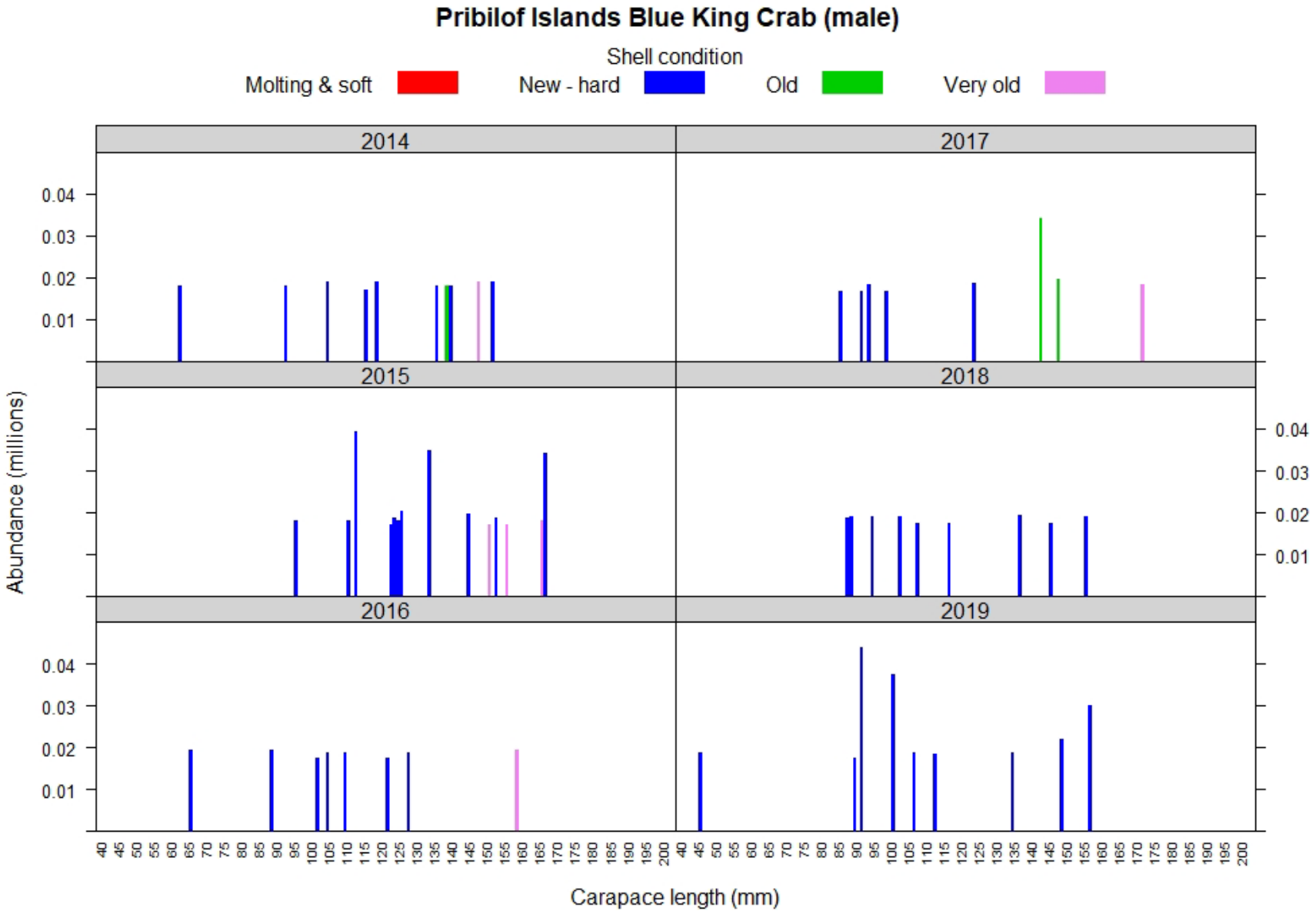


Figure 38. -- Abundance (millions) by size and shell condition of Pribilof District male blue king crab (*Paralithodes platypus*) using 1 mm length classes, 2014-2019.

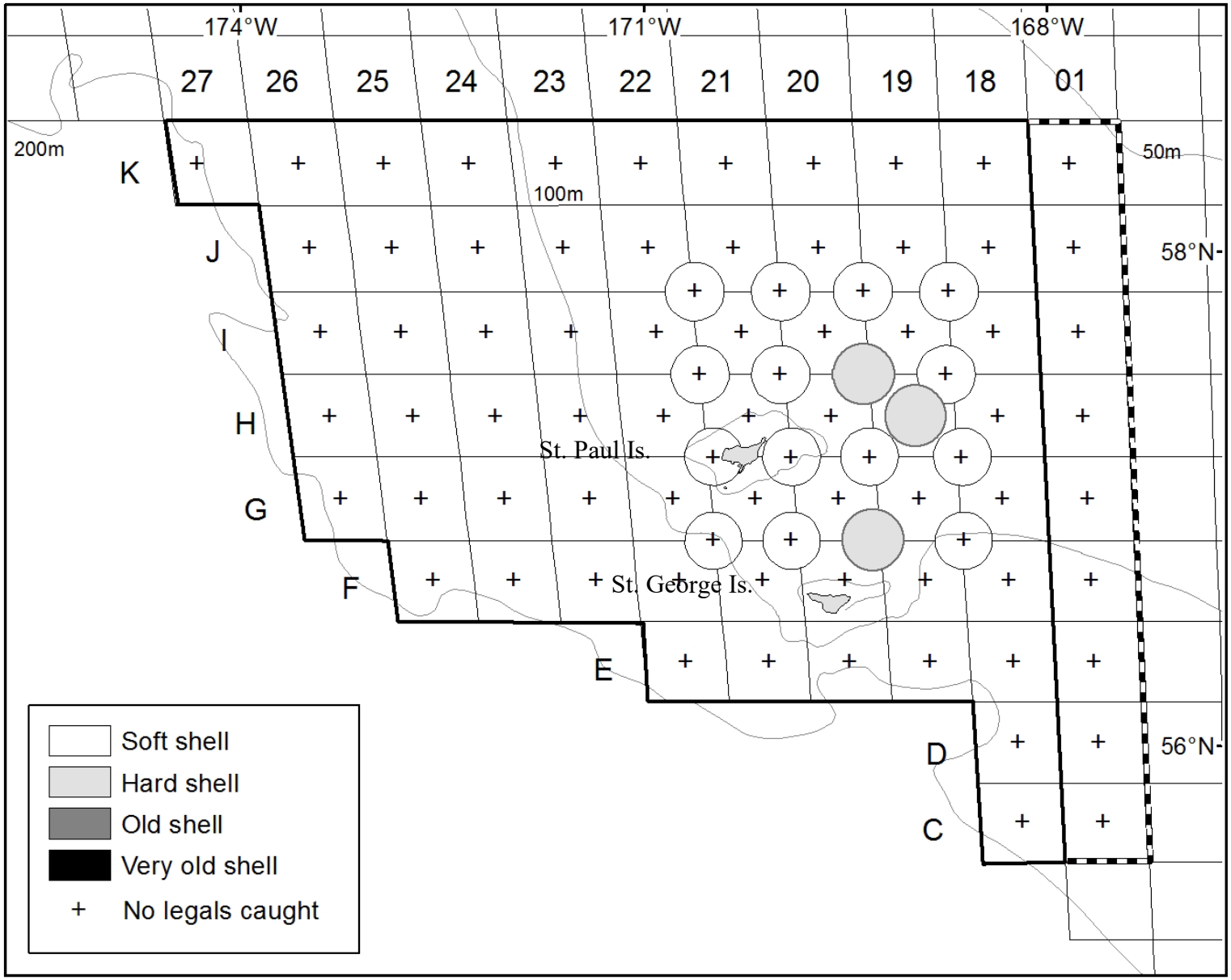


Figure 39. -- Proportion of legal-sized, male blue king crab (*Paralithodes platypus*) shell condition classes caught at each station sampled in 2019 in the Pribilof District. The outlined area depicts the management district as defined by ADF&G.

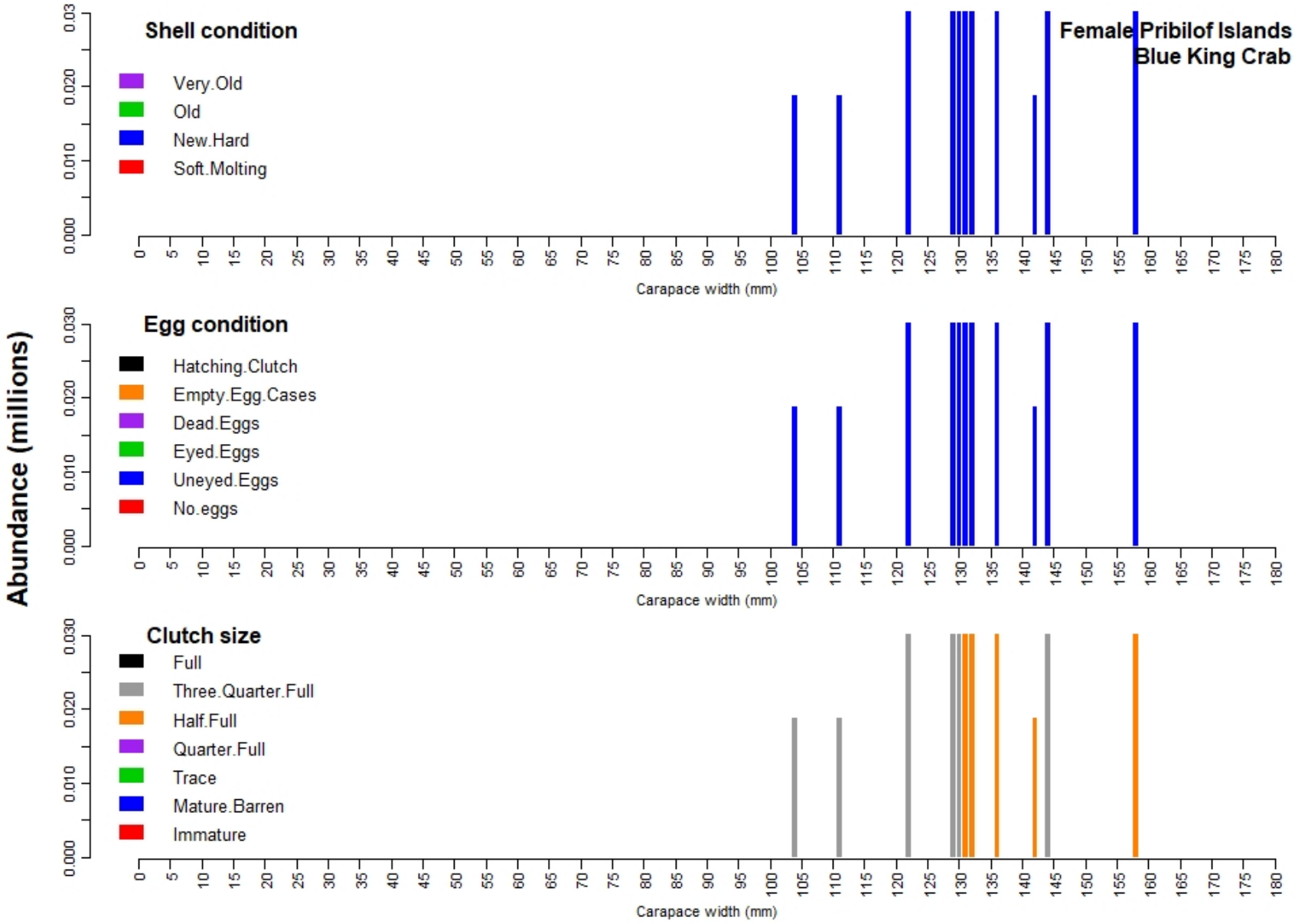


Figure 40. -- Size frequency by shell condition, egg condition, and clutch fullness of Pribilof District female blue king crab (*Paralithodes platypus*) by 1 mm length classes in 2019.

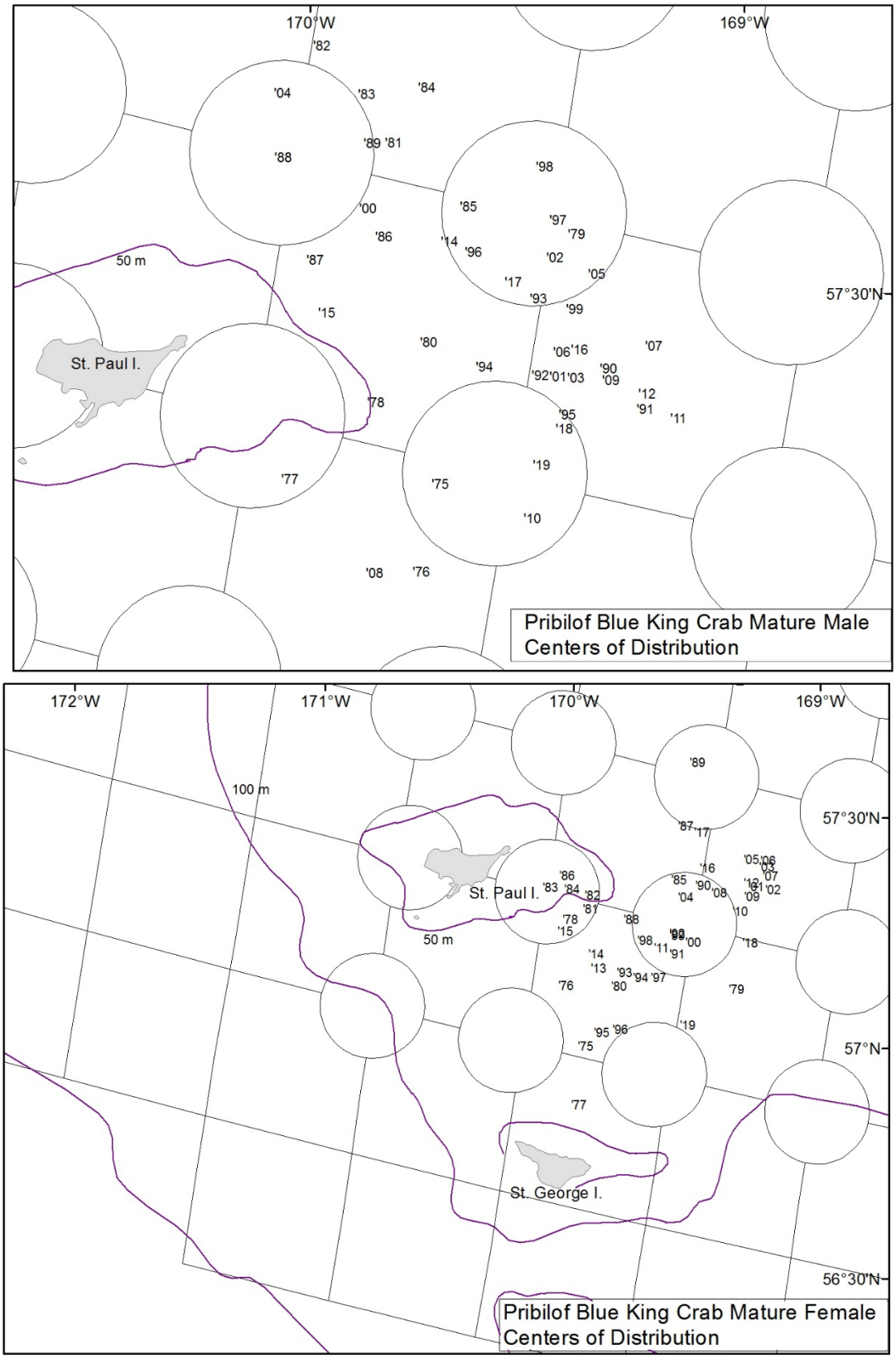


Figure 41. -- Centers of stock distribution of Pribilof Islands mature male (top) and female (bottom) blue king crab (*Paralithodes platypus*) from 1975 to 2019.

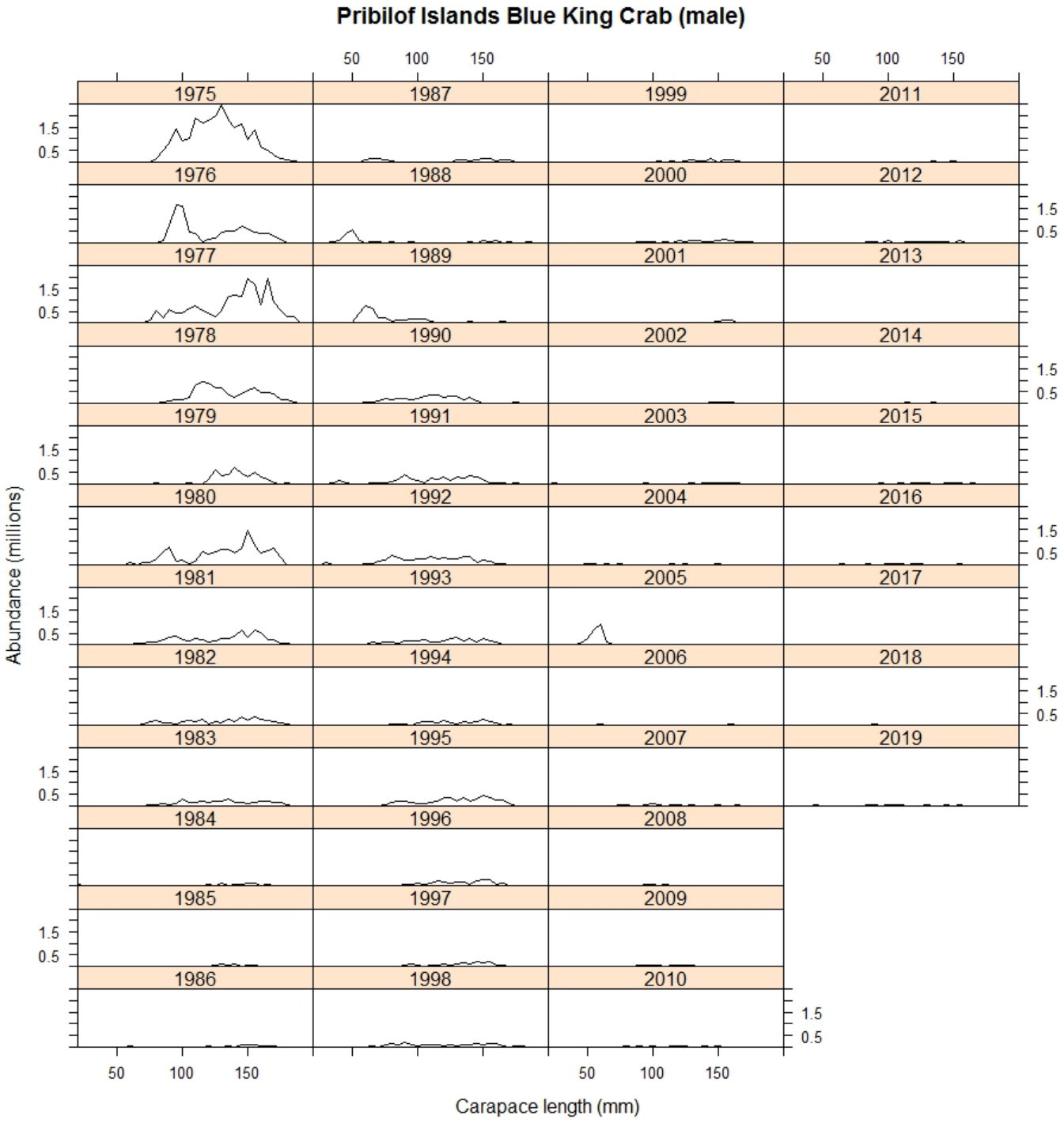


Figure 42. -- Size frequency by 5 mm length classes of Pribilof Islands male blue king crab (*Paralithodes platypus*) from 1975 to 2019.

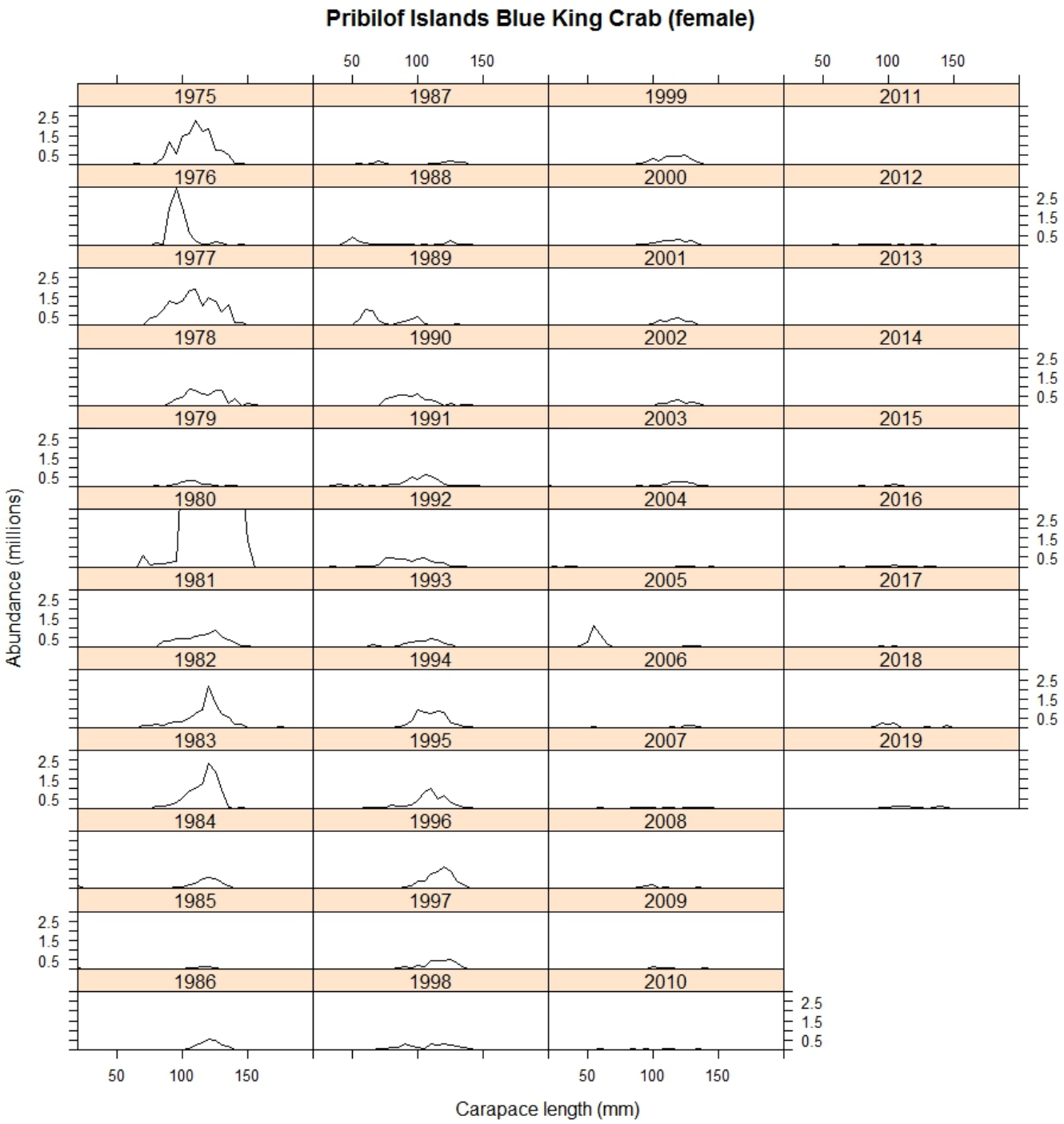


Figure 43. -- Size frequency by 5 mm length classes of Pribilof Islands female blue king crab (*Paralithodes platypus*) from 1975 to 2019.

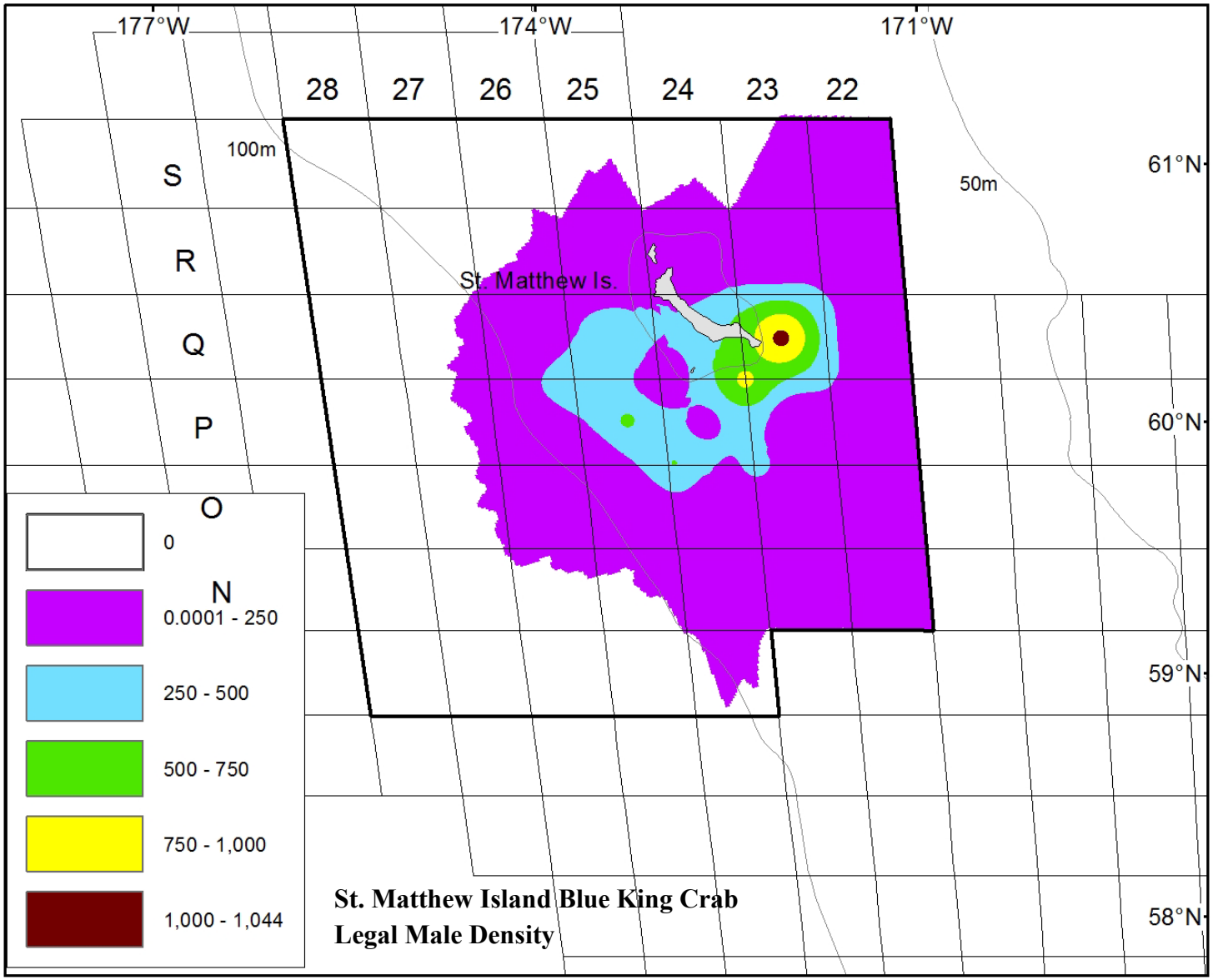


Figure 44. – Estimated total density (number nmi^{-2}) of legal-sized male blue king crab (*Paralithodes platypus*) at each station sampled in the St. Matthew Island Section of the Northern District in 2019. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

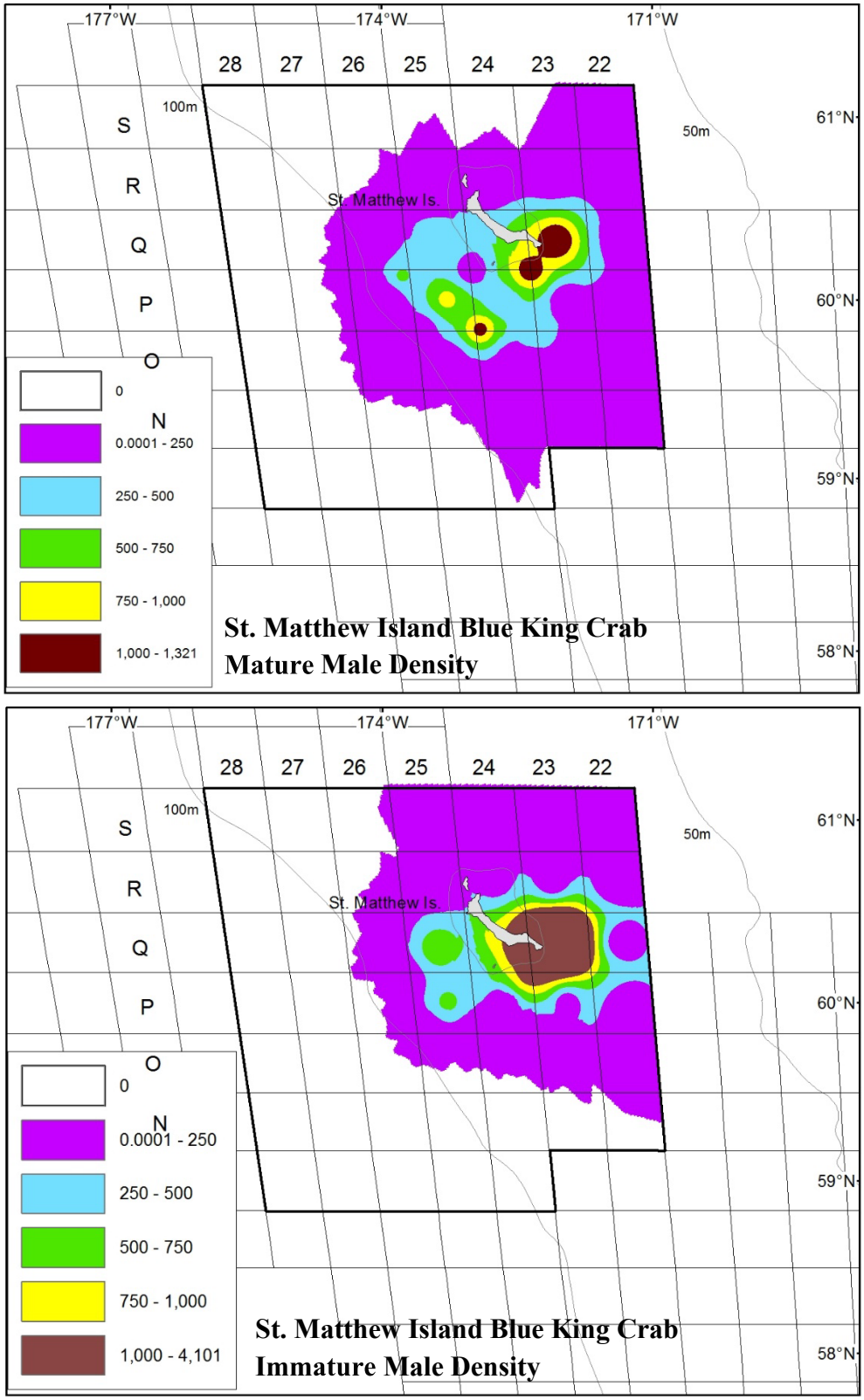


Figure 45. – Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the St. Matthew Island Section of the Northern District in 2019. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

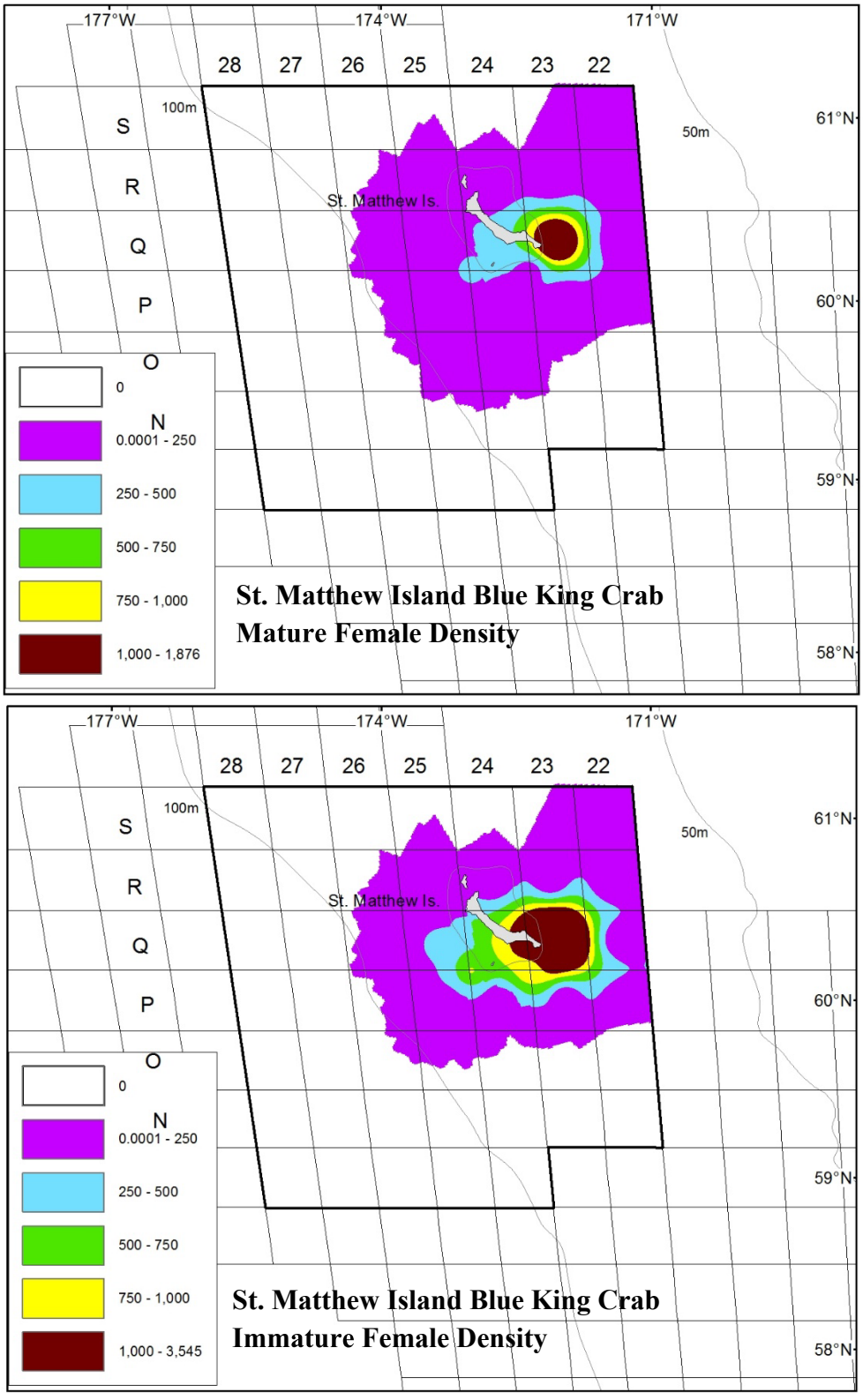


Figure 46. – Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the St. Matthew Island Section of the Northern District in 2019. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

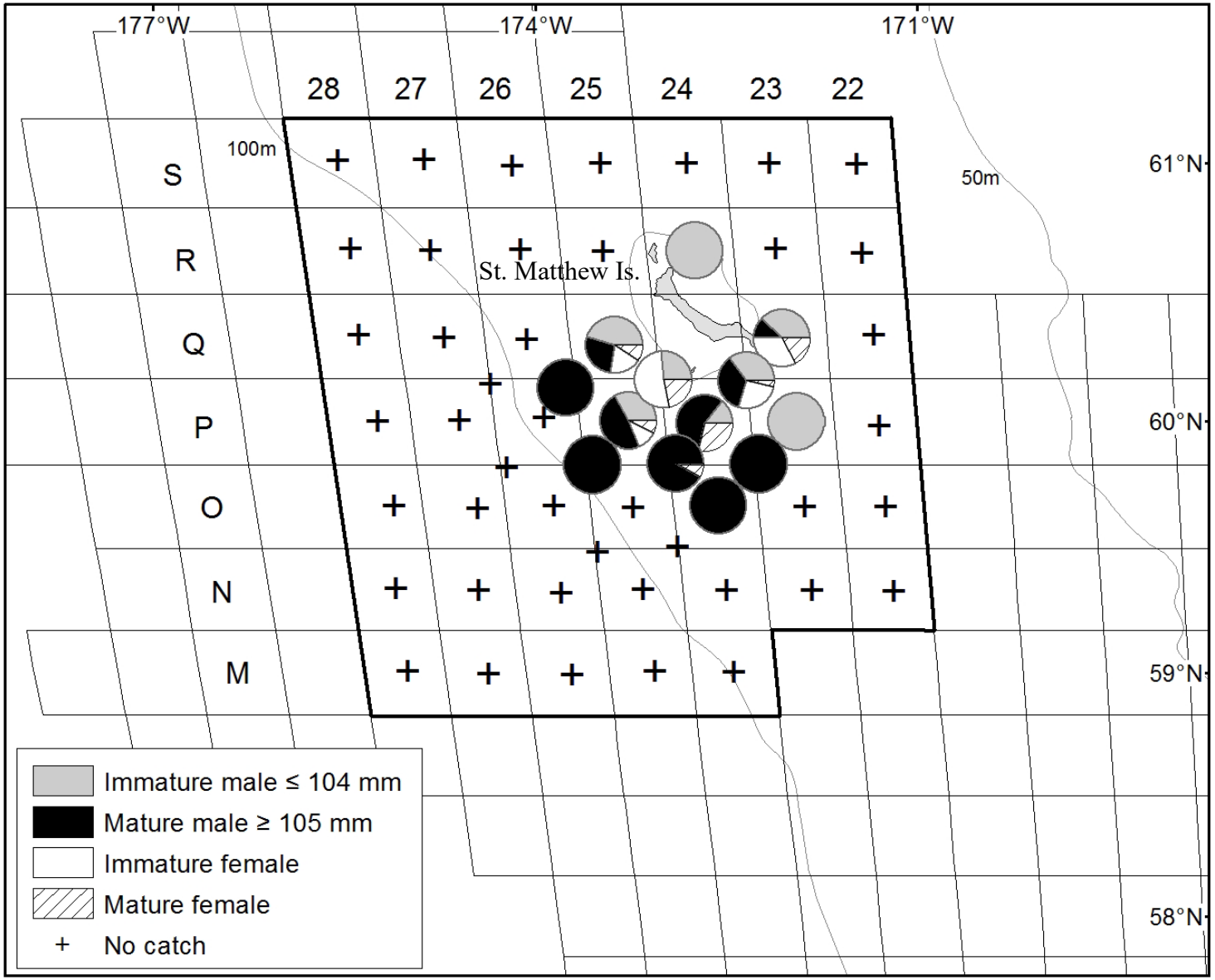


Figure 47. -- Proportion of male and female blue king crab (*Paralithodes platypus*) maturity classes caught at each station sampled in 2019 in the St. Matthew Island Section of the Northern District. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

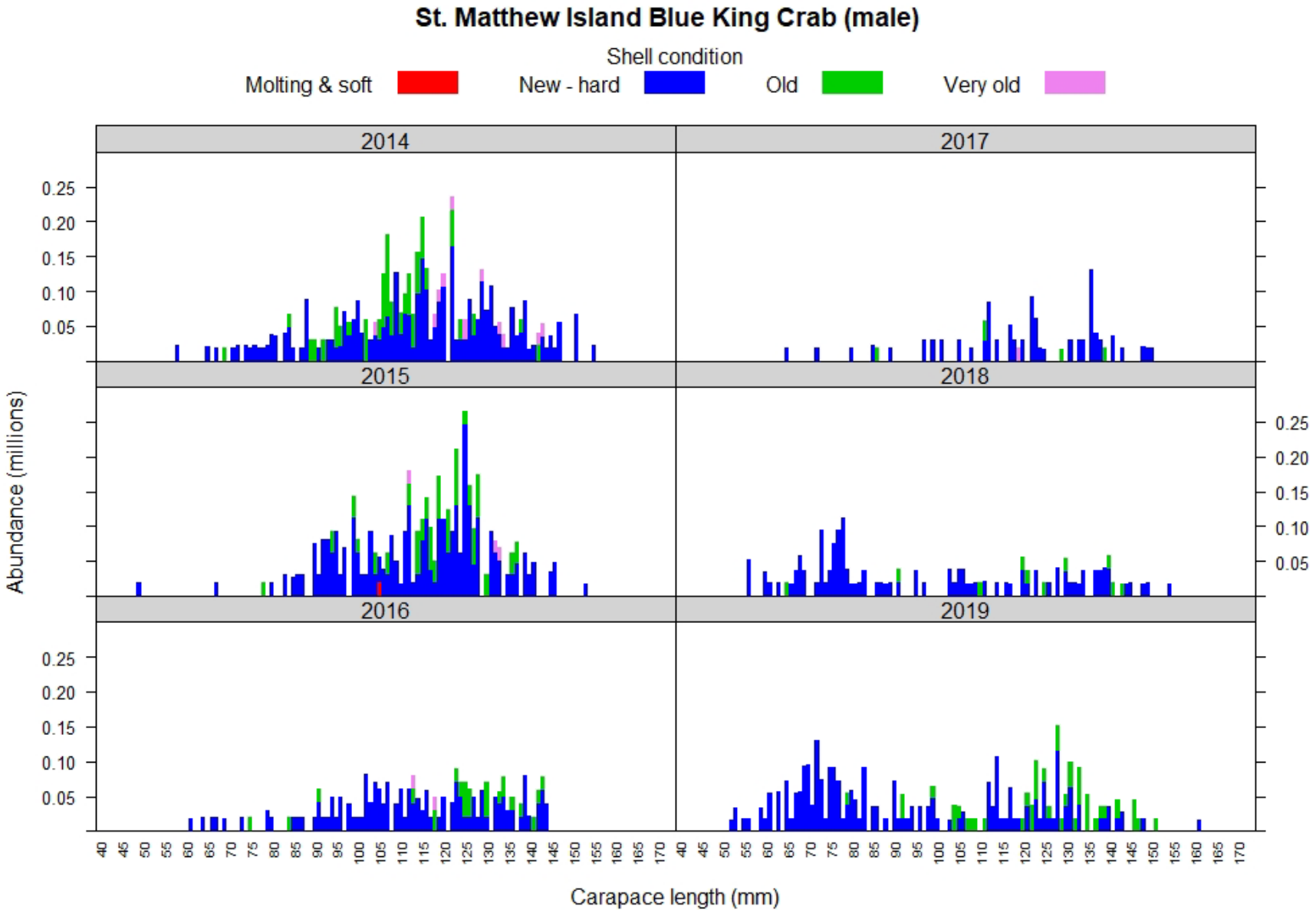


Figure 48. -- Abundance (millions) by size and shell condition of St. Matthew Island Section male blue king crab (*Paralithodes platypus*) using 1 mm length classes, 2014-2019.

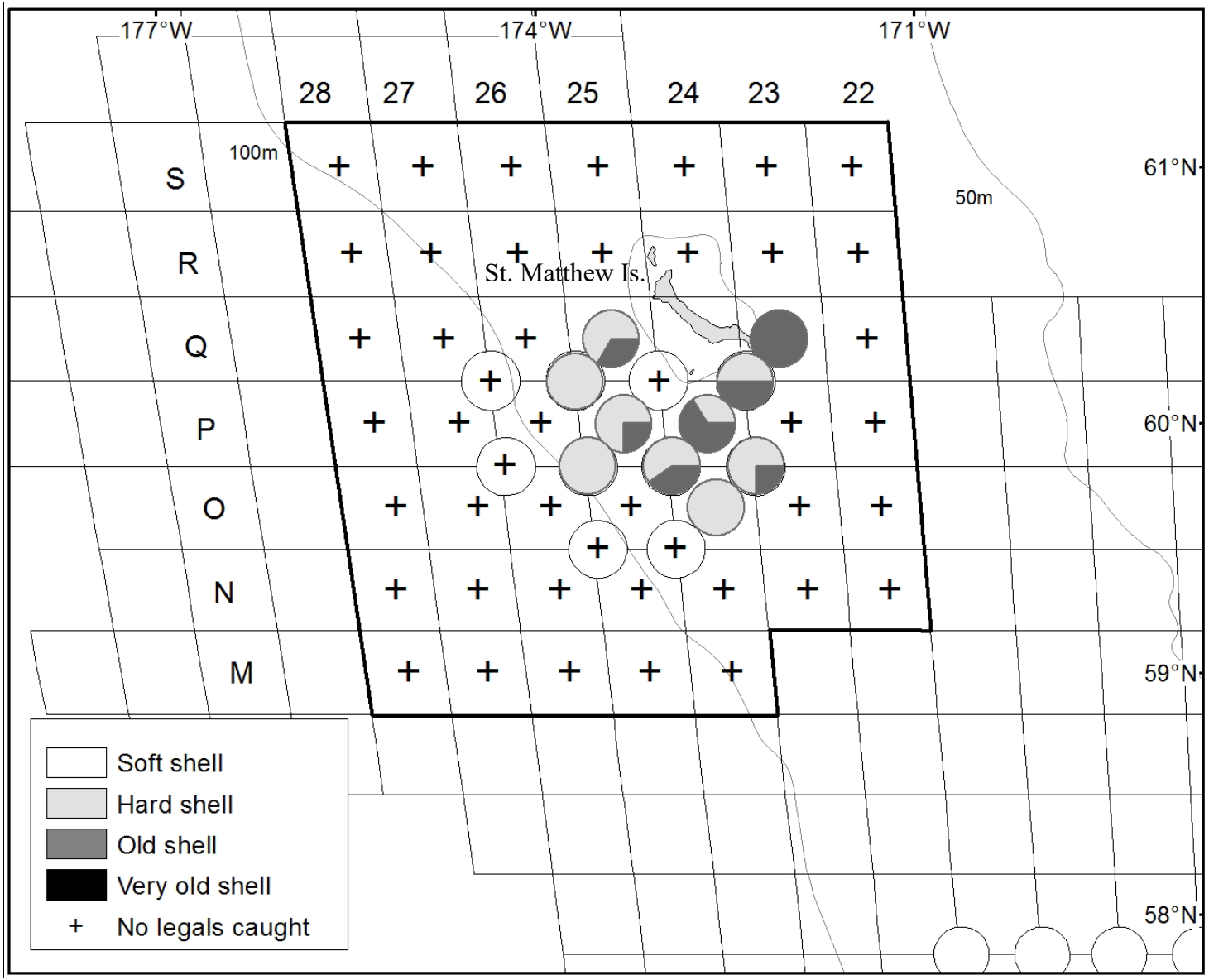


Figure 49. -- Proportion of legal-sized, male blue king crab (*Paralithodes platypus*) shell condition classes caught at each station sampled in 2019 in the St. Matthew Island Section of the Northern District. The outlined area depicts stations within the St. Matthew Island Section sampling strata.

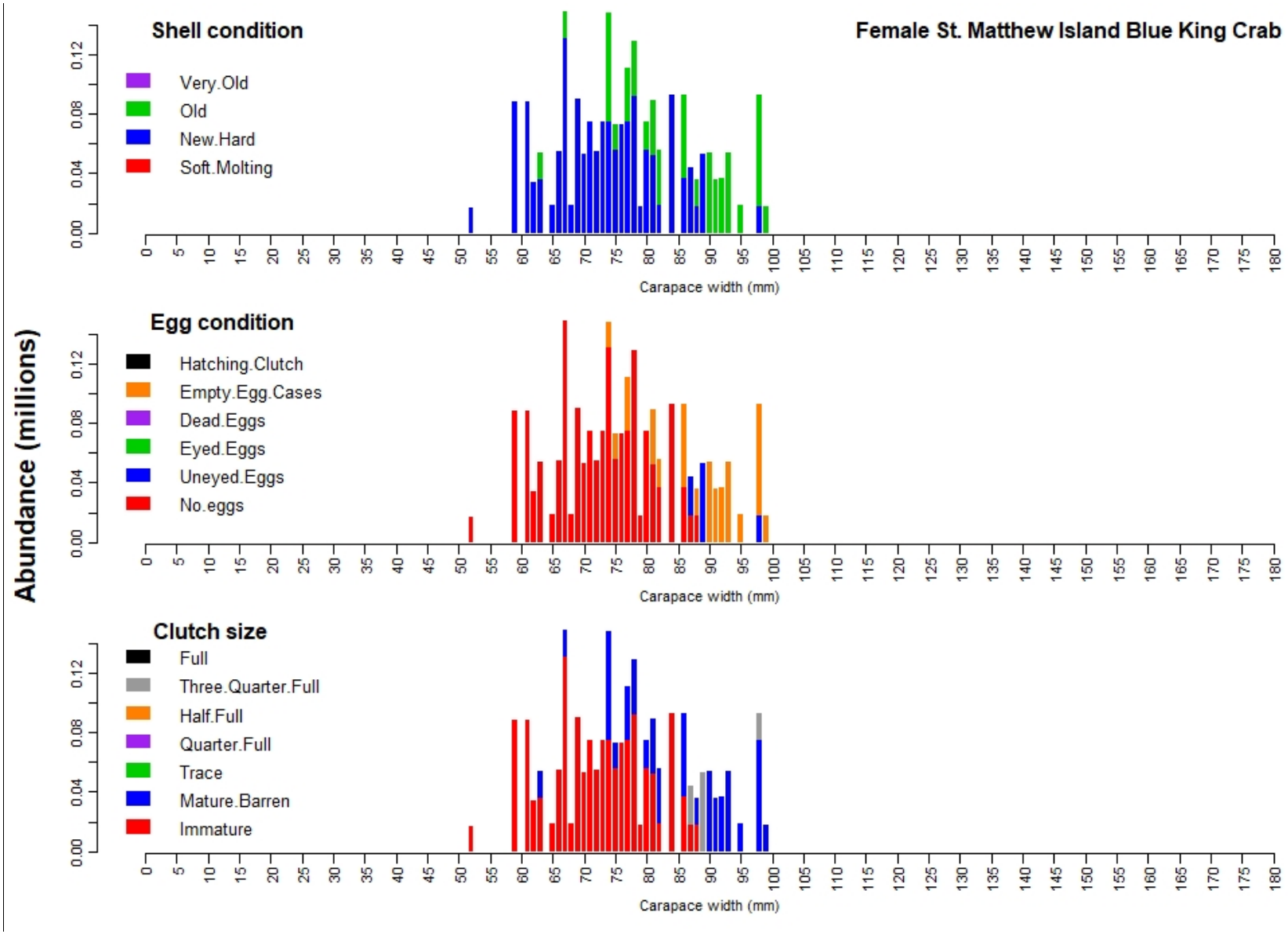


Figure 50. -- Size frequency by shell condition, egg condition, and clutch size of St. Matthew Island Section female blue king crab (*Paralithodes platypus*) by 1 mm length classes in 2019.

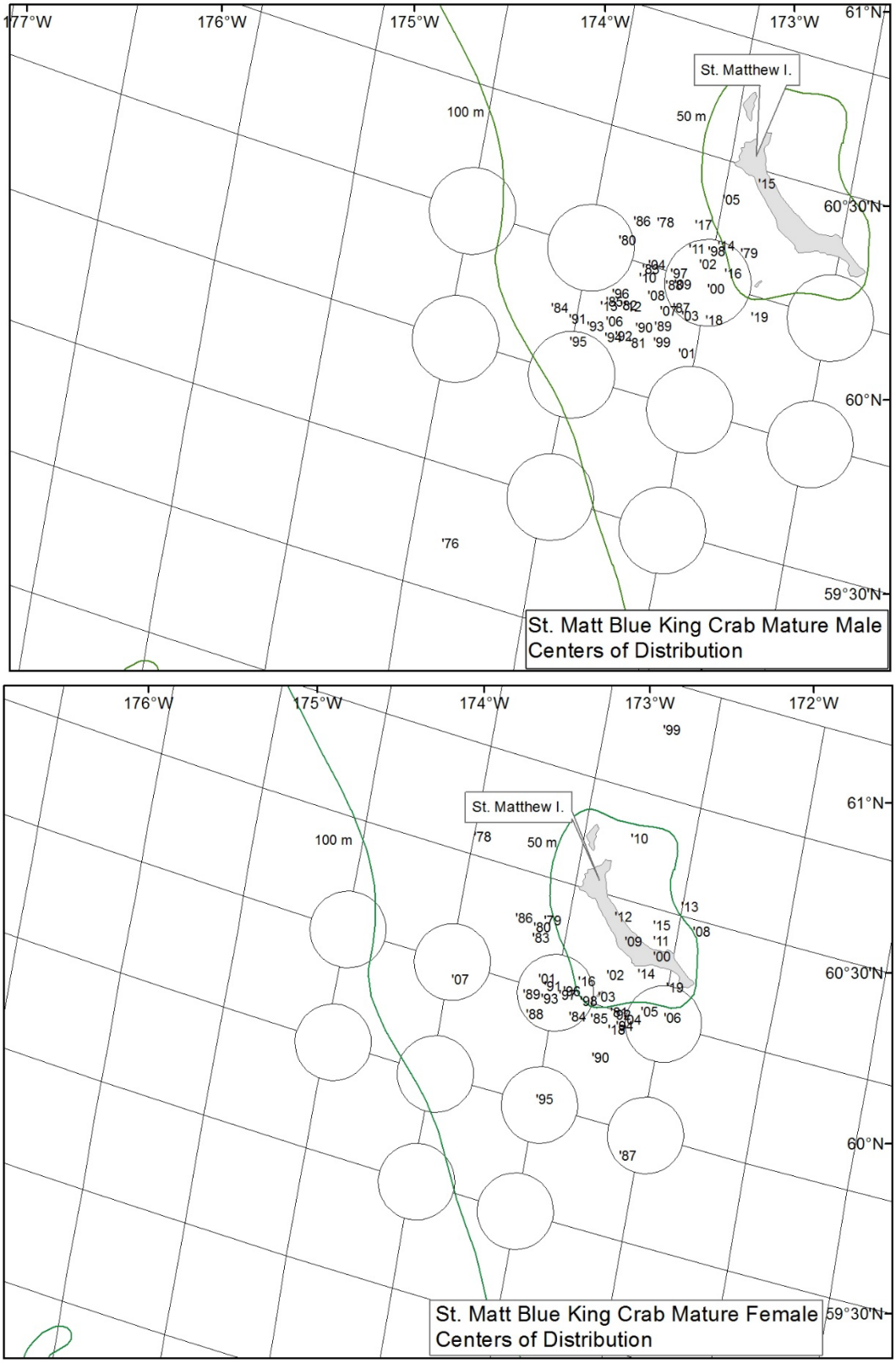


Figure 51. -- Centers of stock distribution of St. Matthew Island mature male (top) and female (bottom) blue king crab (*Paralithodes platypus*) from 1975 to 2019.

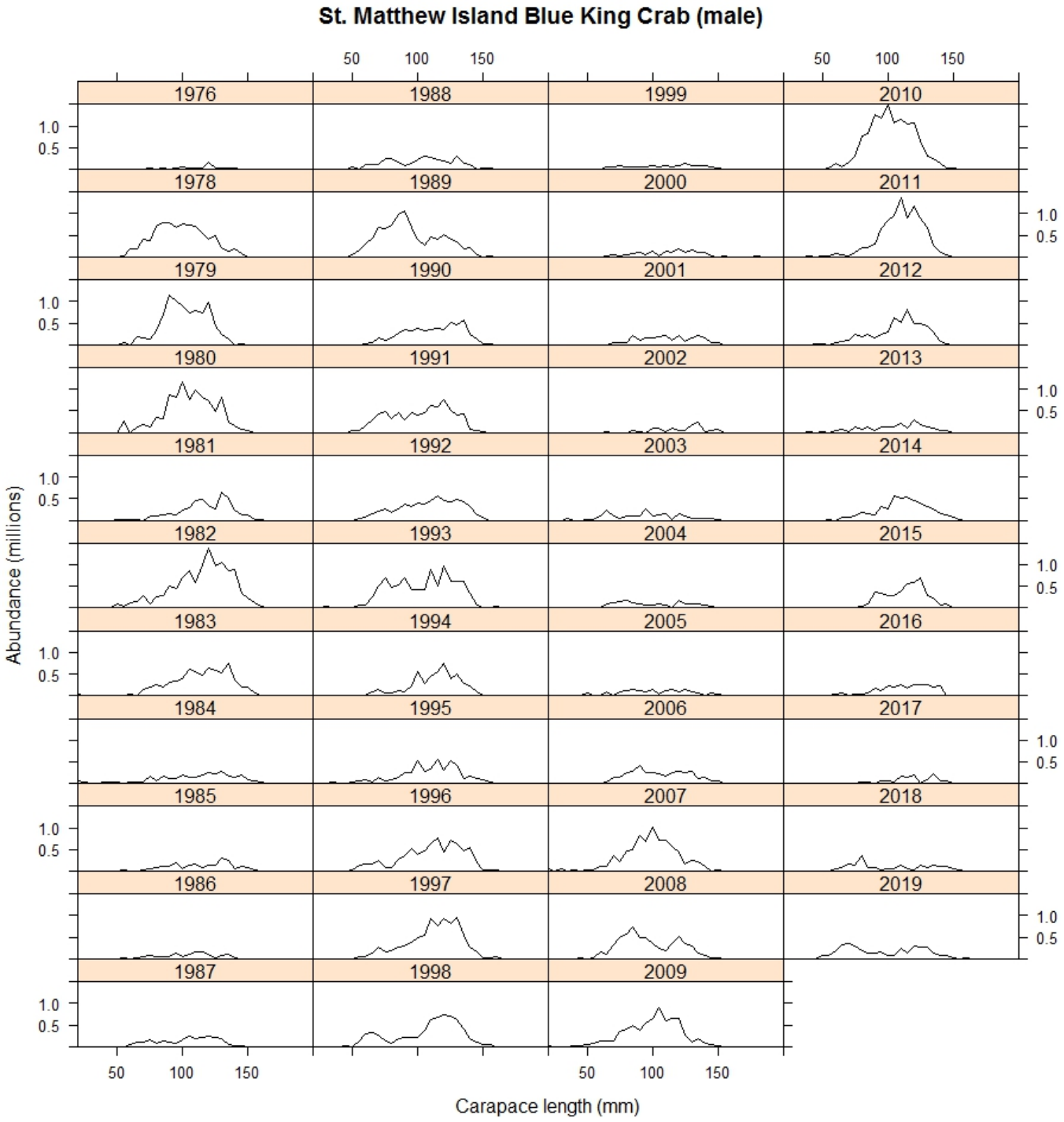


Figure 52. -- Size frequency by 5 mm length classes of St. Matthew Island Section male blue king crab (*Paralithodes platypus*) from 1976 to 2019.

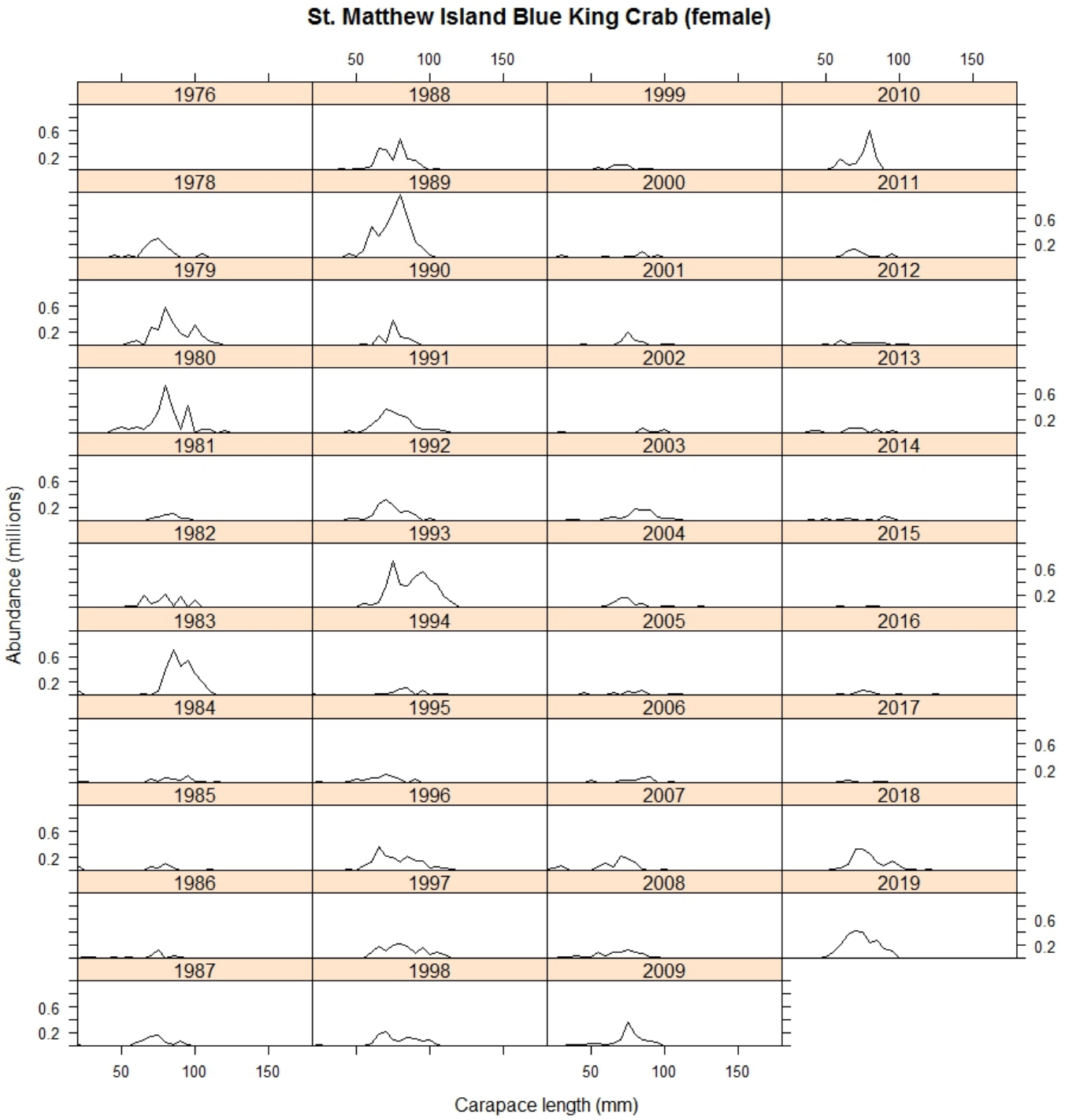


Figure 53. -- Size frequency by 5 mm length classes of St. Matthew Island Section female blue king crab (*Paralithodes platypus*) from 1976 to 2019.

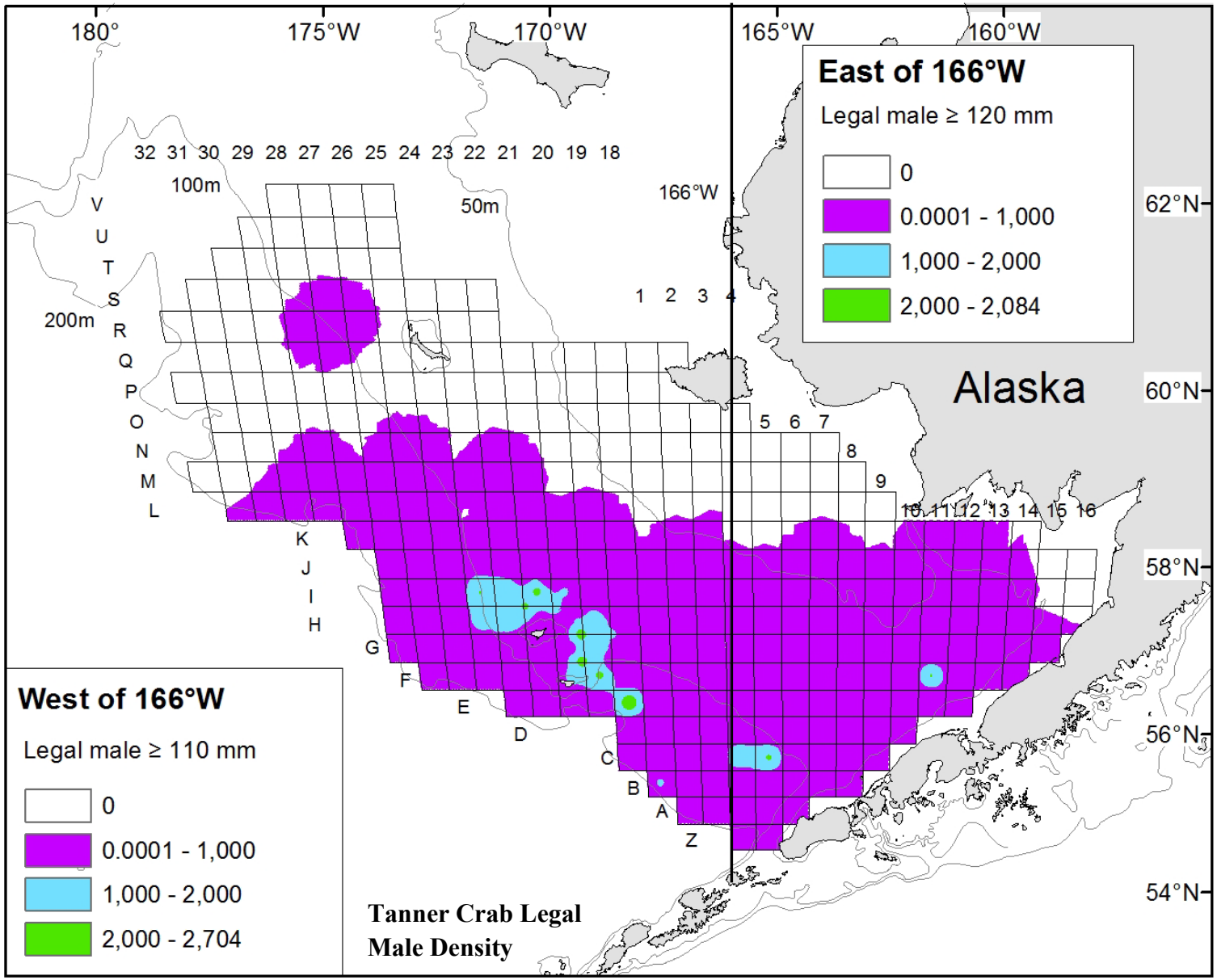


Figure 54. -- Estimated total density (number nmi^{-2}) of legal-sized male Tanner crab (*Chionoecetes bairdi*) at each station sampled in 2019. Note the size definition of legal males differs between the two management areas.

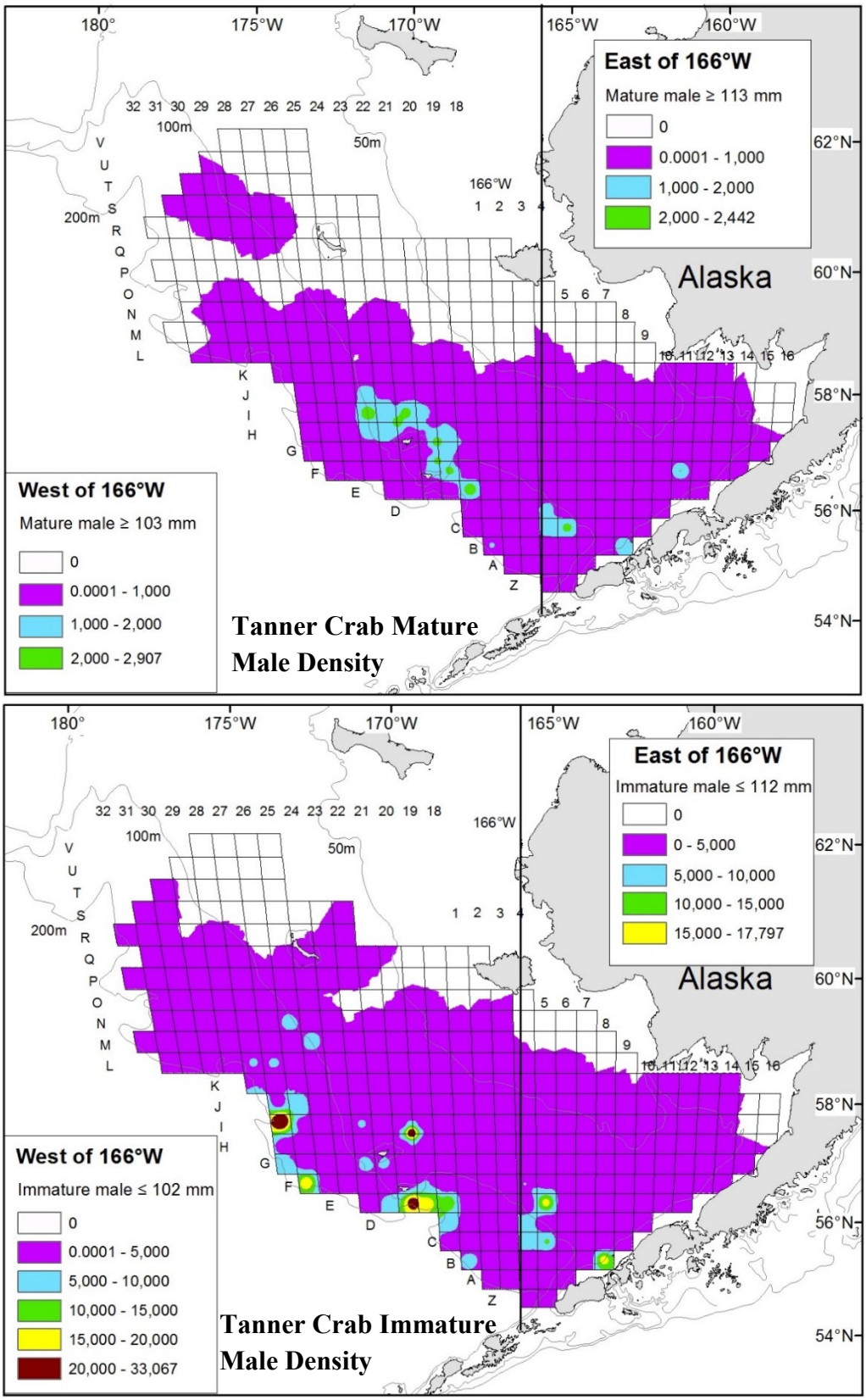


Figure 55. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) Tanner crab (*Chionoecetes bairdi*) at each station sampled in 2019. Note the size definition of immature and mature males differs between the two management areas.

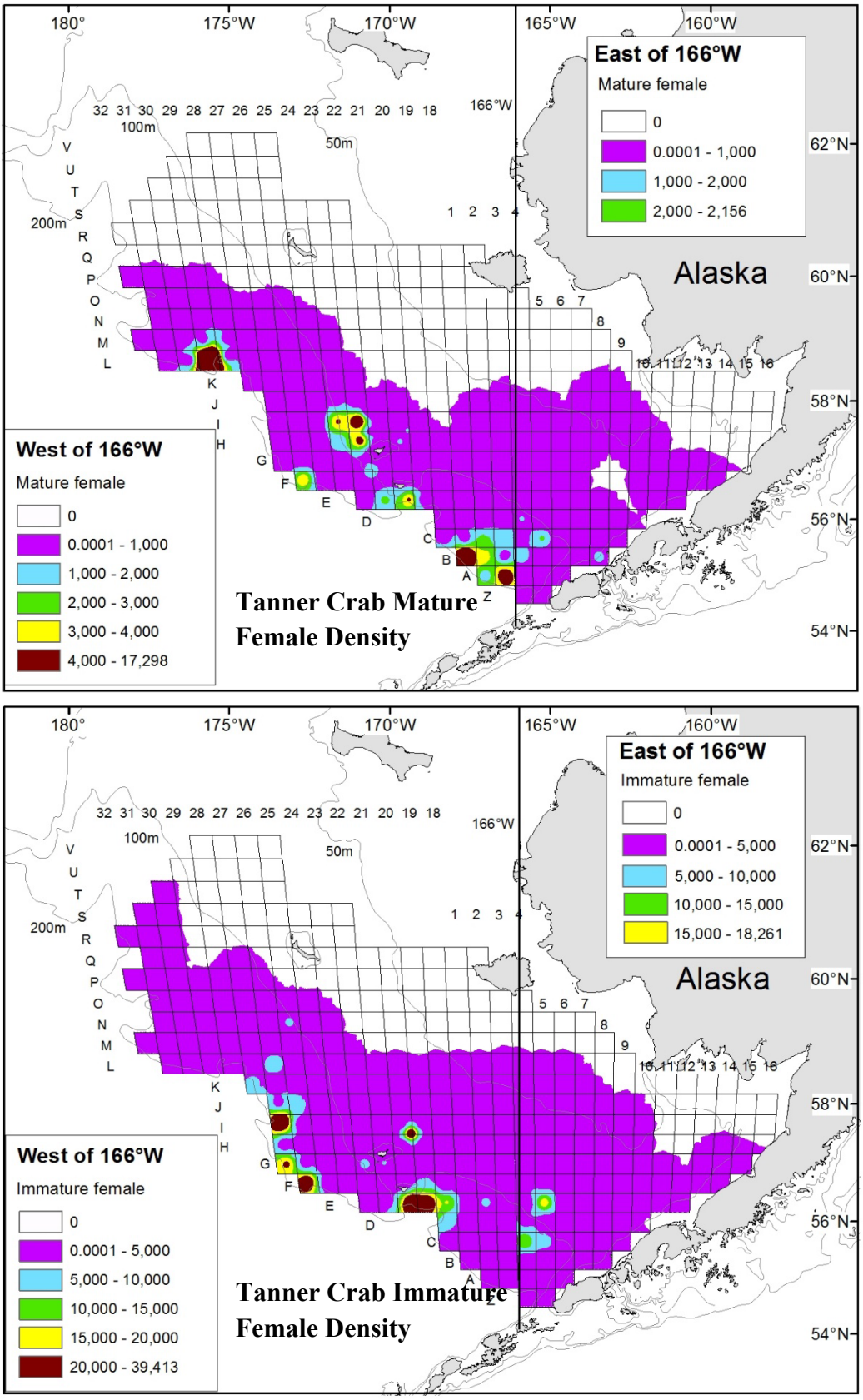


Figure 56. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) Tanner crab (*Chionoecetes bairdi*) at each station sampled in 2019.

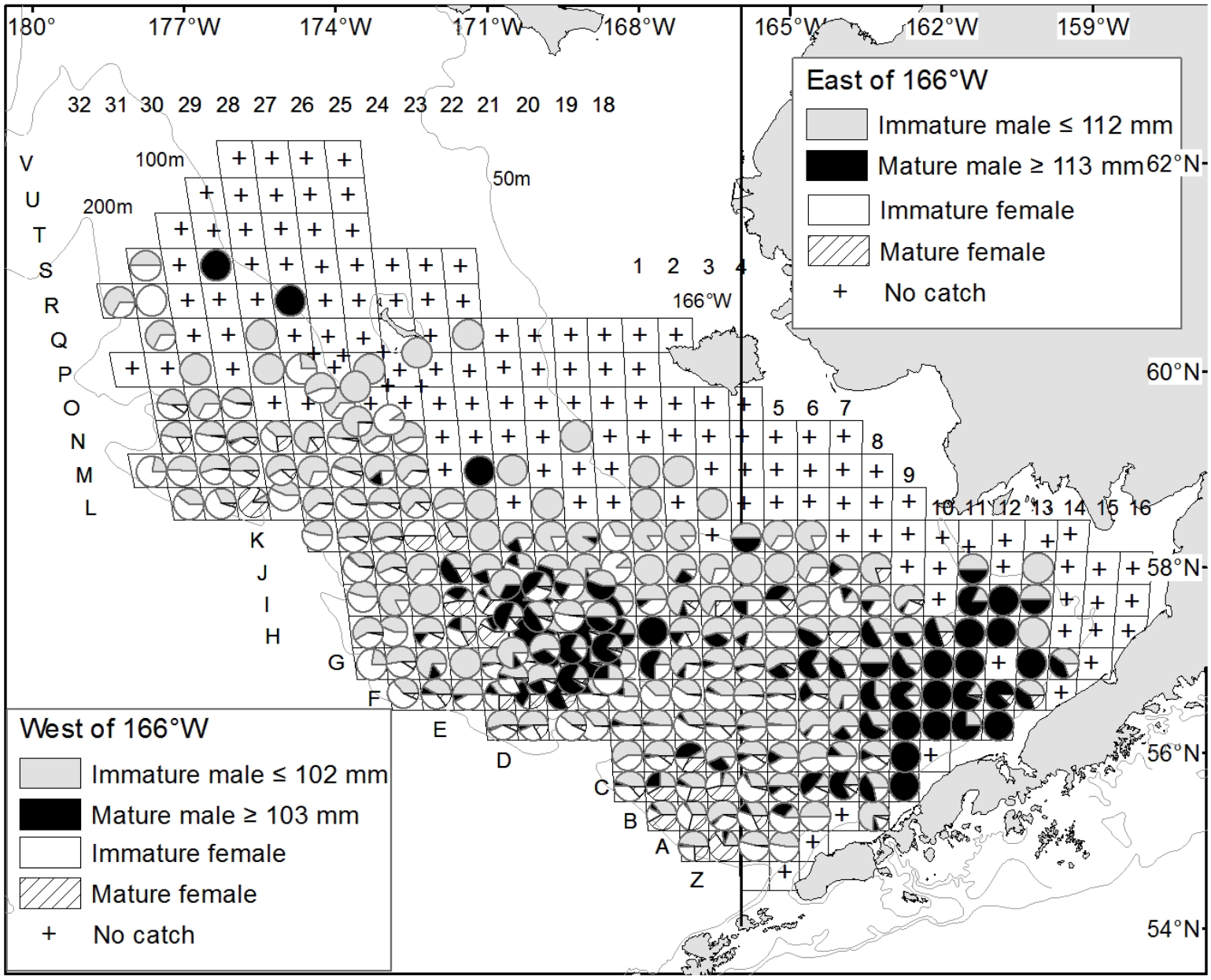


Figure 57. -- Proportion of male and female Tanner crab (*Chionoecetes bairdi*) maturity classes caught at each station sampled in 2019.

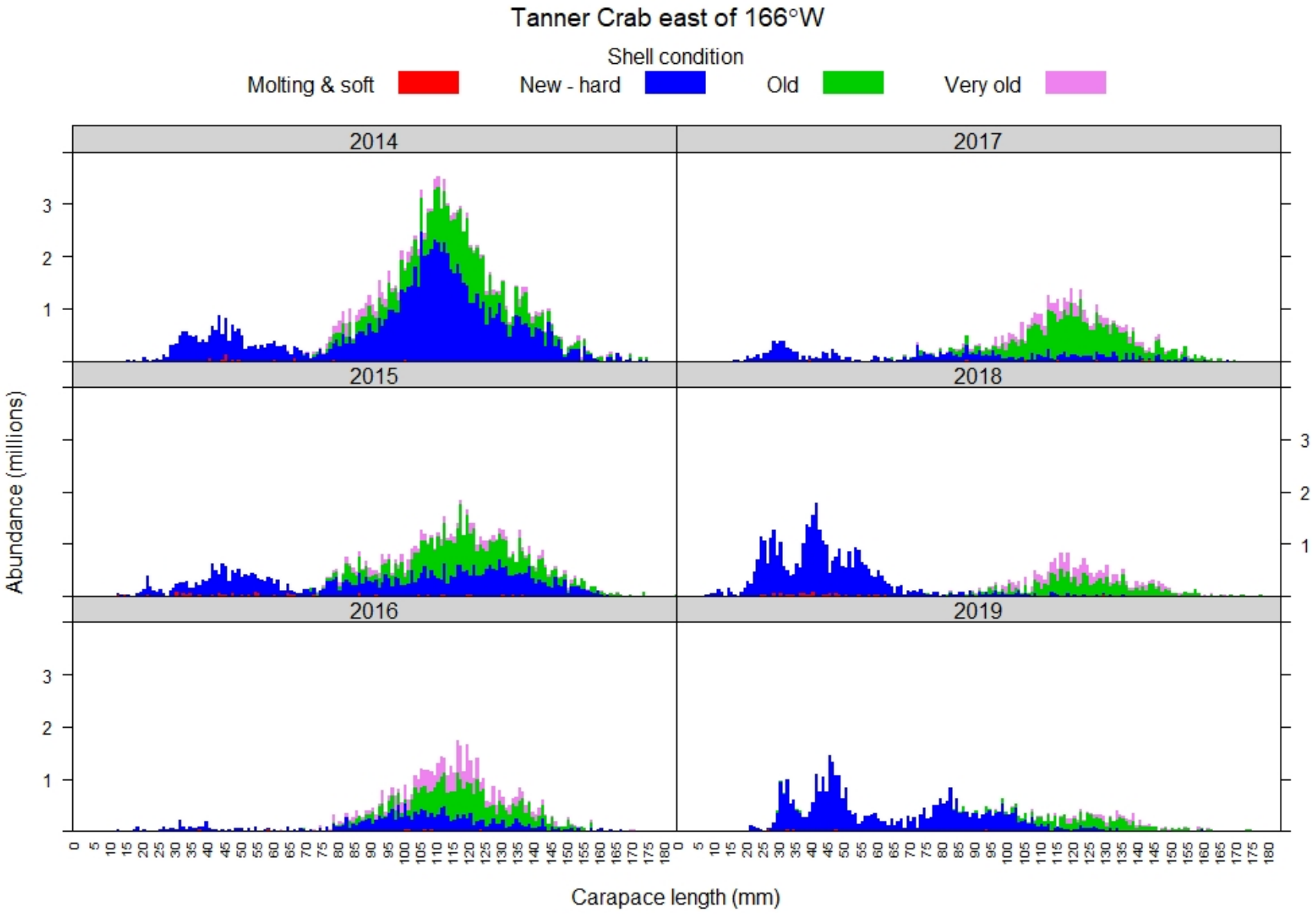


Figure 58. -- Abundance (millions) by size and shell condition of male Tanner crab (*Chionoecetes bairdi*) east of 166° W using 1 mm width classes of all districts combined, 2014-2019.

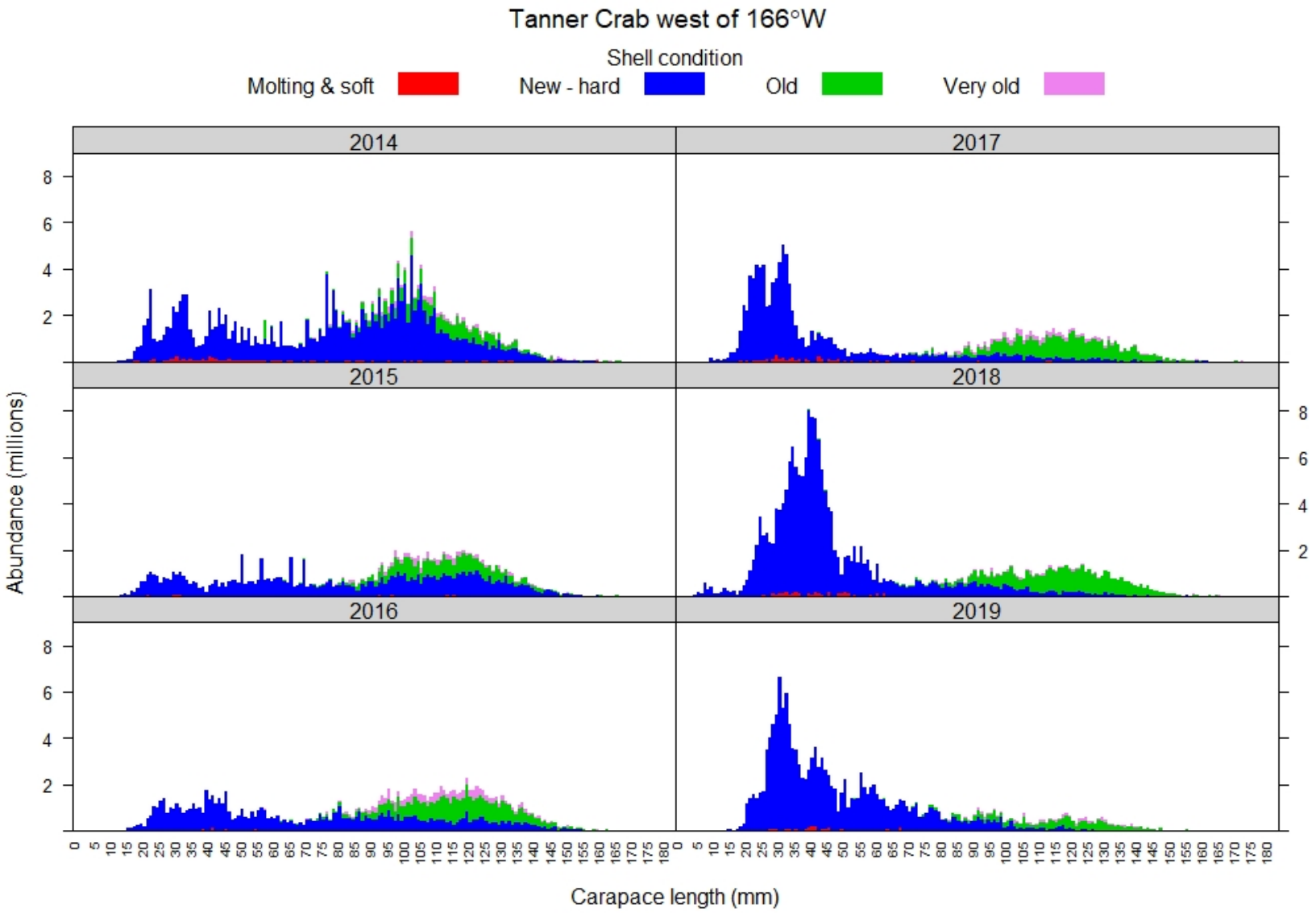


Figure 59. -- Abundance (millions) by size and shell condition of male Tanner crab (*Chionoecetes bairdi*) west of 166° W using 1 mm width classes of all districts combined, 2014-2019.

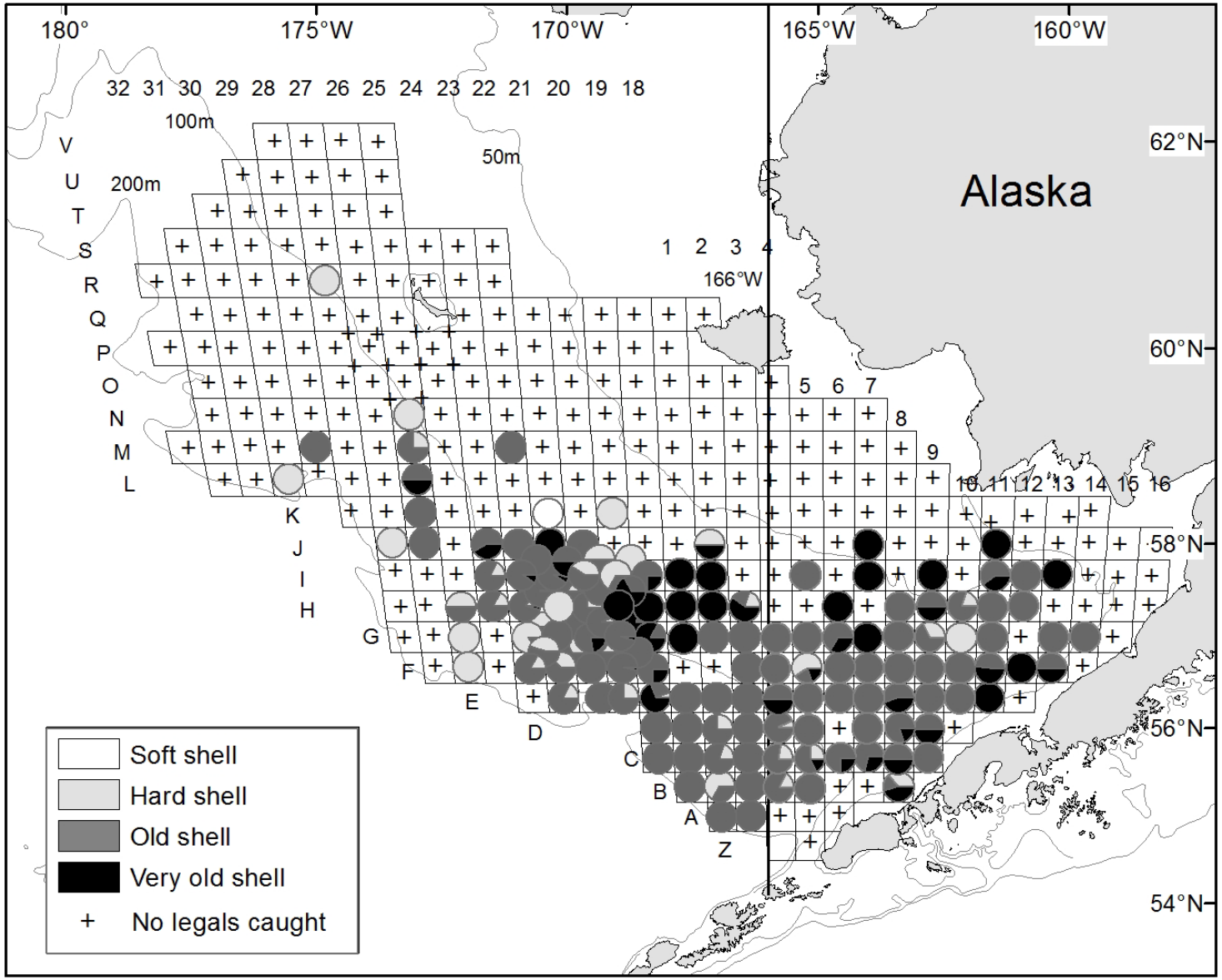


Figure 60. -- Proportion of legal-sized, male Tanner crab (*Chionoecetes bairdi*) shell condition classes caught at each station sampled in 2019. Tanner male crab ≥ 120 mm and ≥ 110 mm CW are the legal-size categories for east and west of 166° W, respectively.

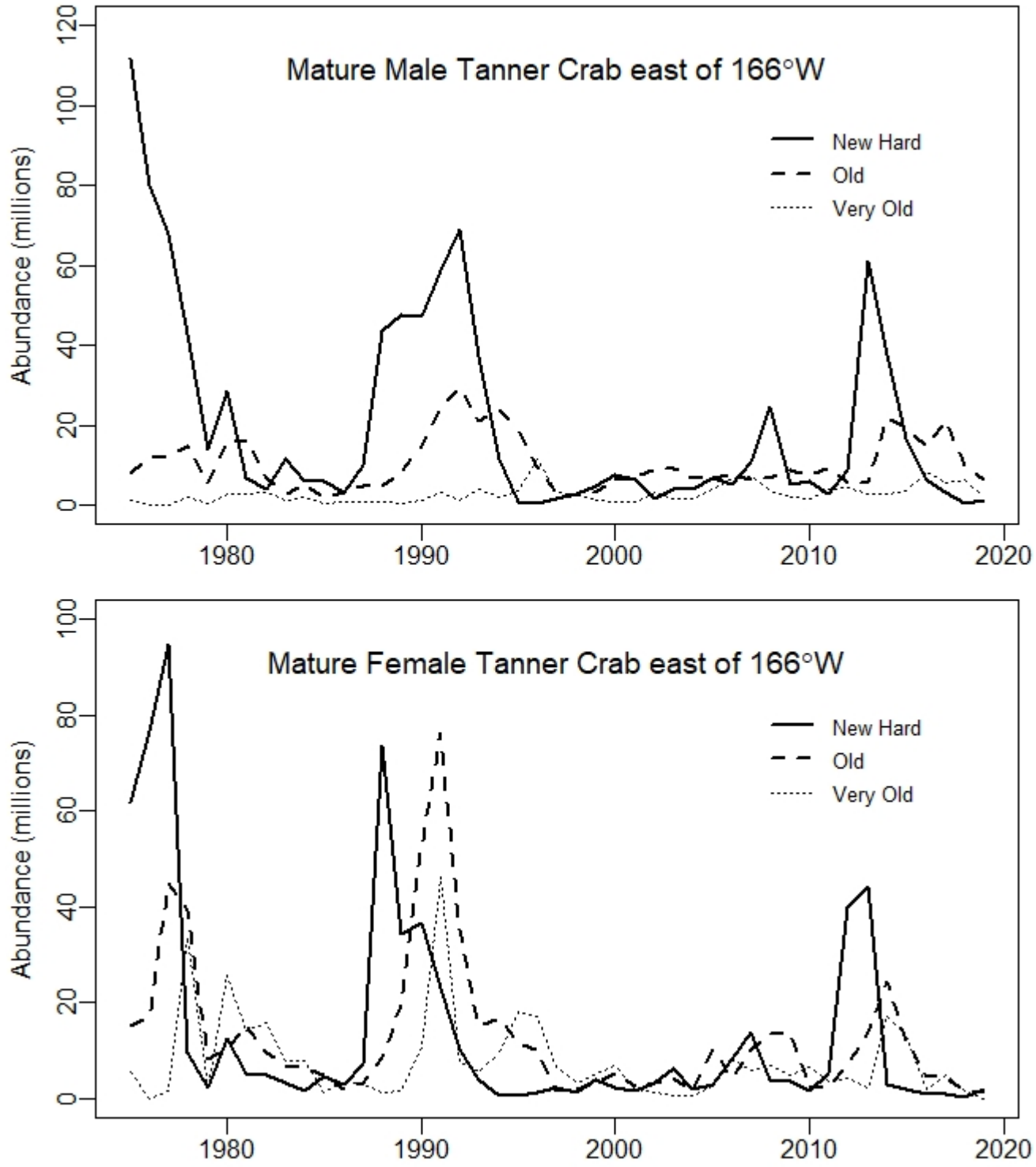


Figure 61. -- Time series of mature male (≥ 113 mm CW) and female (actual maturity) Tanner crab (*Chionoecetes bairdi*) abundance east of 166° W by shell condition, 1975-2019. New- Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

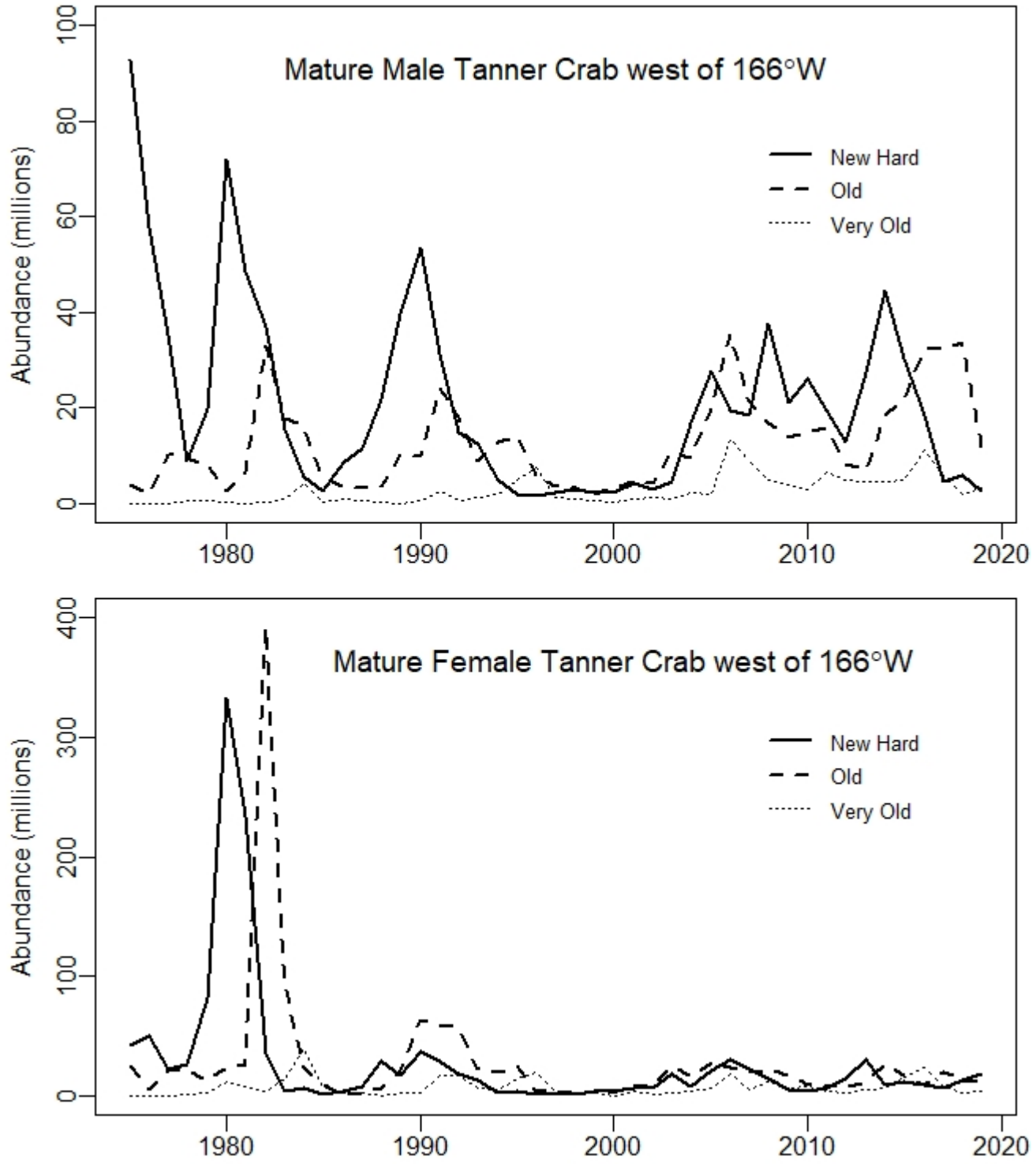


Figure 62. -- Time series of mature male (≥ 103 mm CW) and female (actual maturity) Tanner crab (*Chionoecetes bairdi*) abundance west of 166° W by shell condition, 1975-2019. New- Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

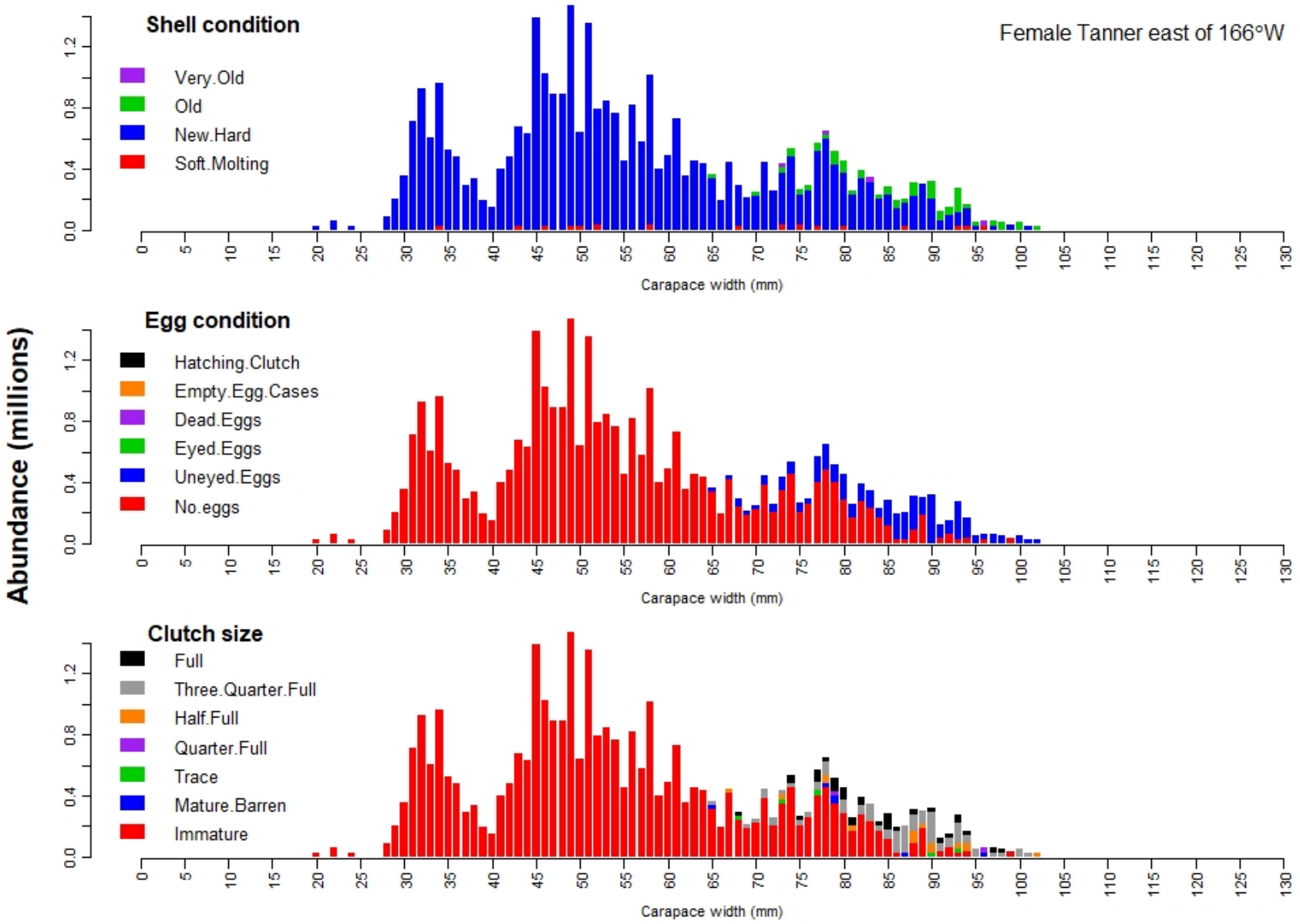


Figure 63. -- Size frequency by shell condition, egg condition, and clutch fullness of female Tanner crab (*Chionoecetes bairdi*) east of 166° W by 1 mm width classes for all districts combined in 2019.

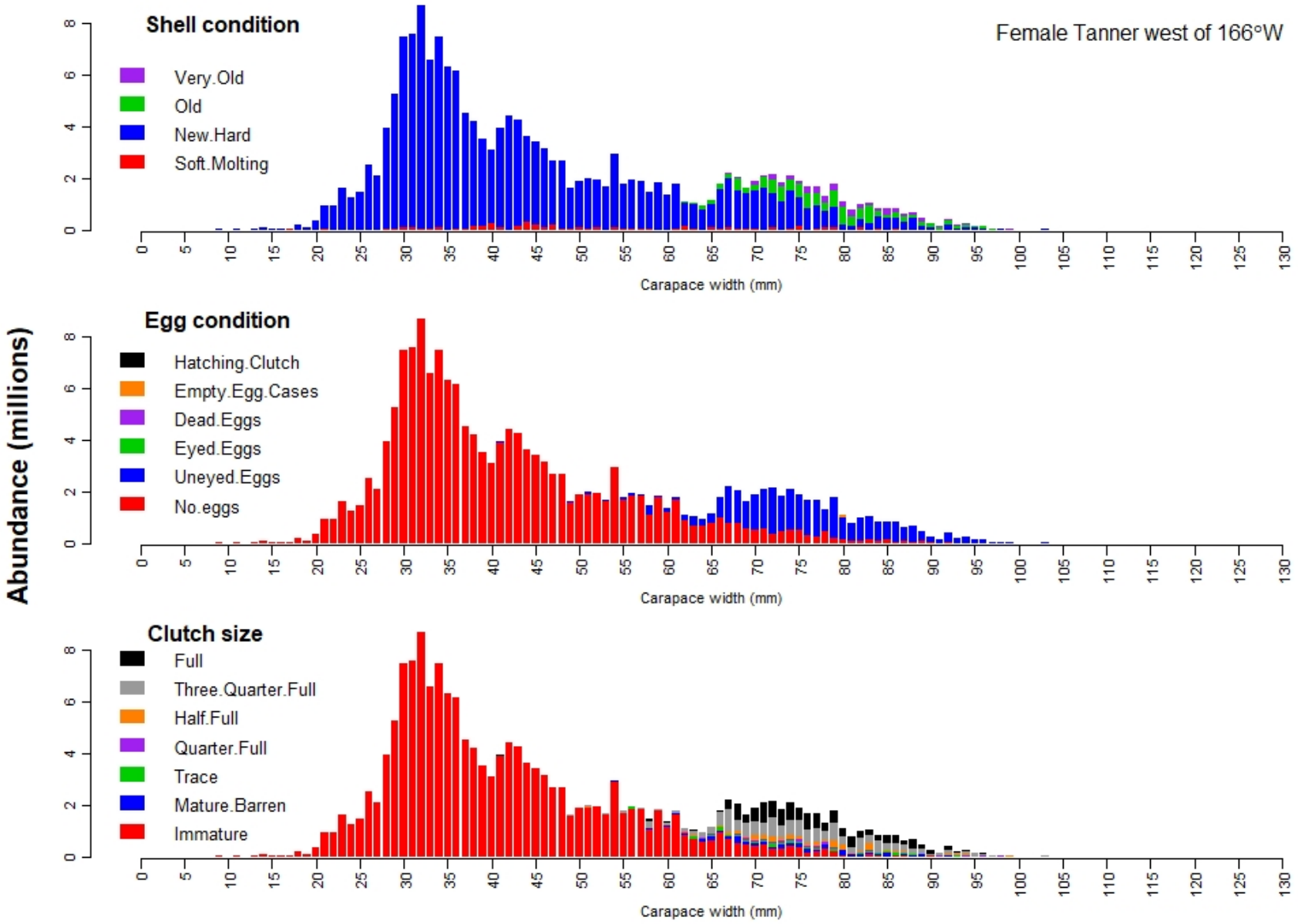


Figure 64. -- Size frequency by shell condition, egg condition, and clutch fullness of female Tanner crab (*Chionoecetes bairdi*) west of 166° W by 1 mm width classes for all districts combined in 2019.

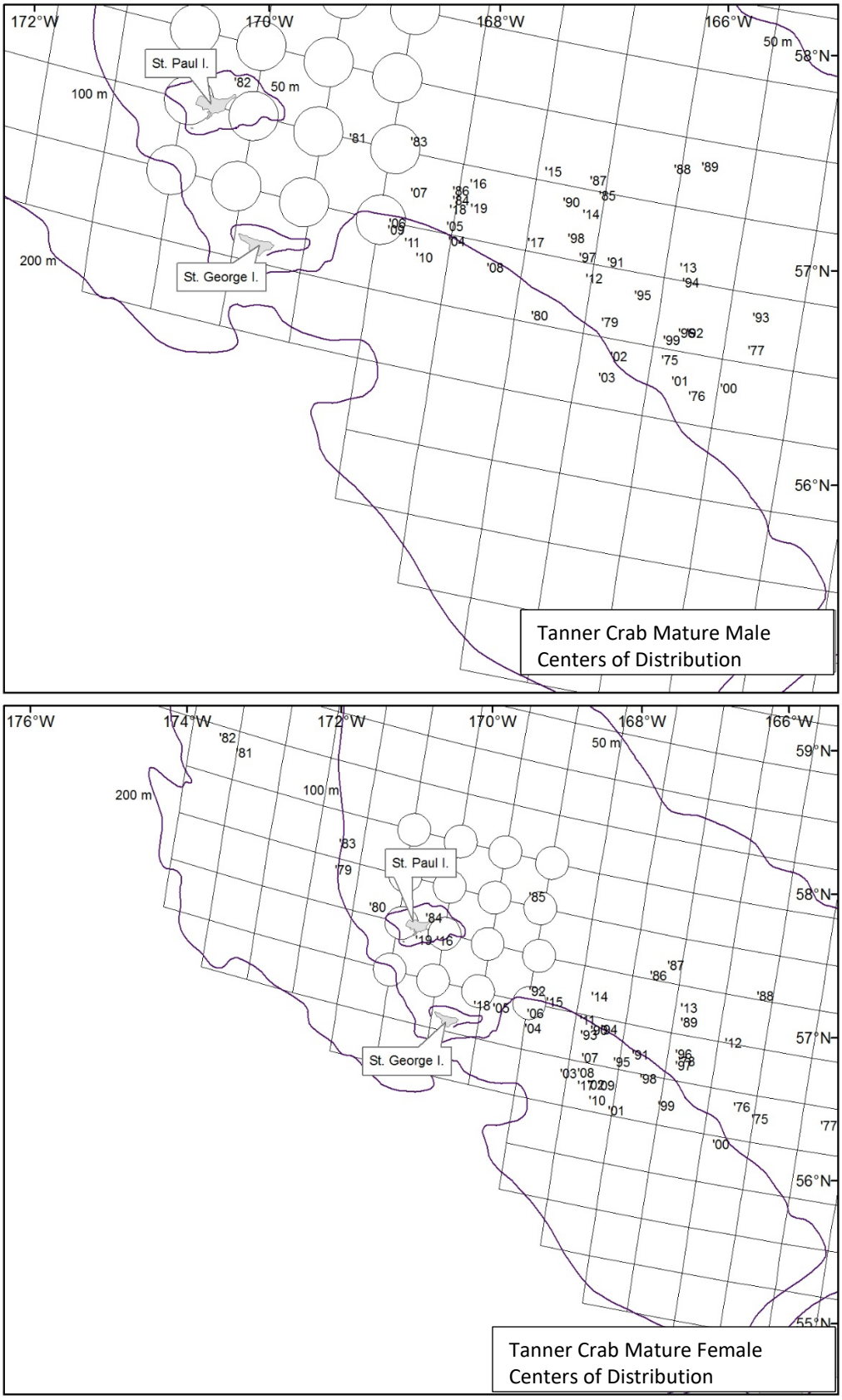


Figure 65. -- Centers of stock distribution of mature male (top) and female (bottom) Tanner crab (*Chionoecetes bairdi*) from 1975 to 2019.

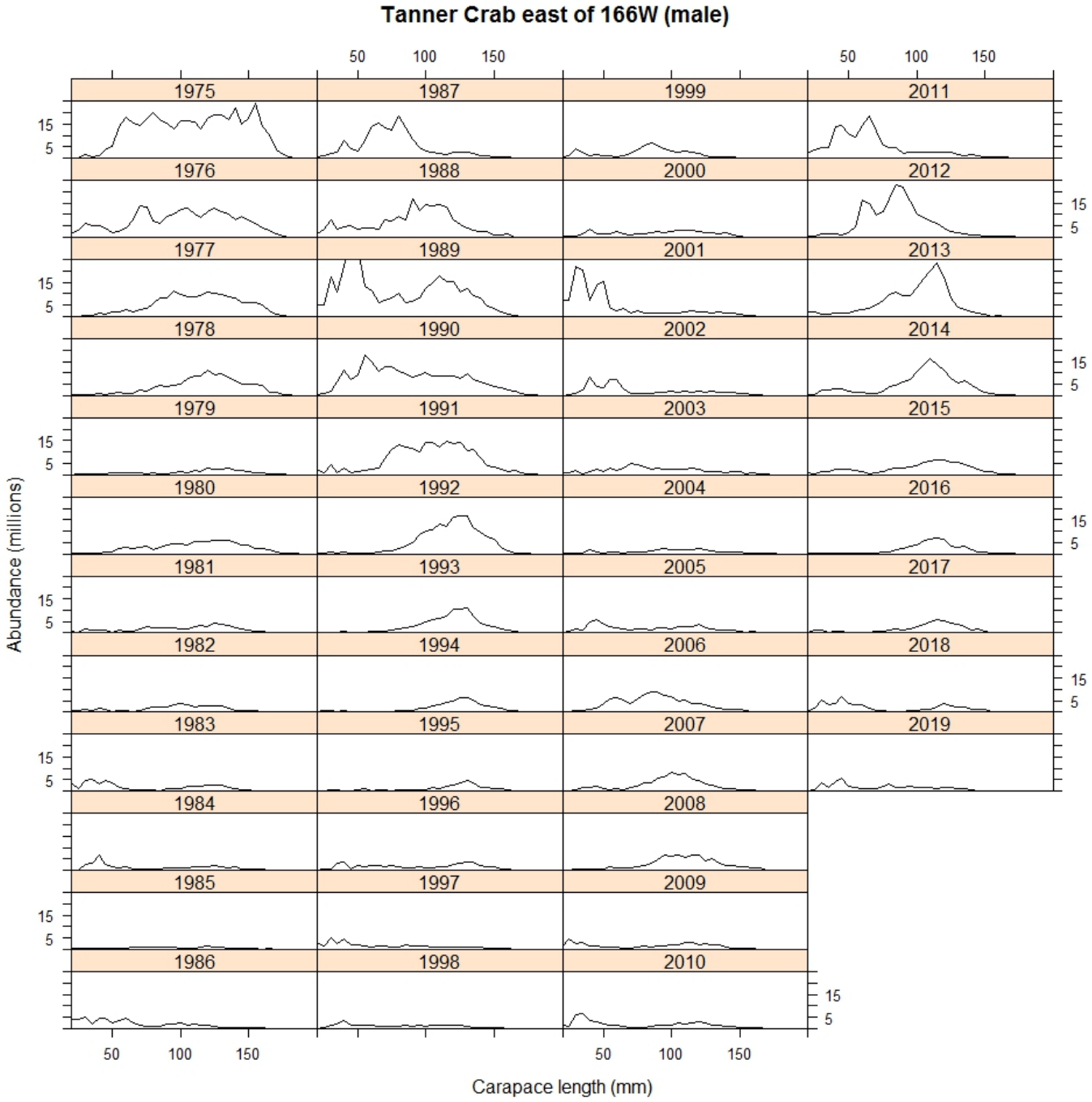


Figure 66. -- Historical size frequency by 5 mm width classes of male Tanner crab (*Chionoecetes bairdi*) east of 166° W, 1975 to 2019.

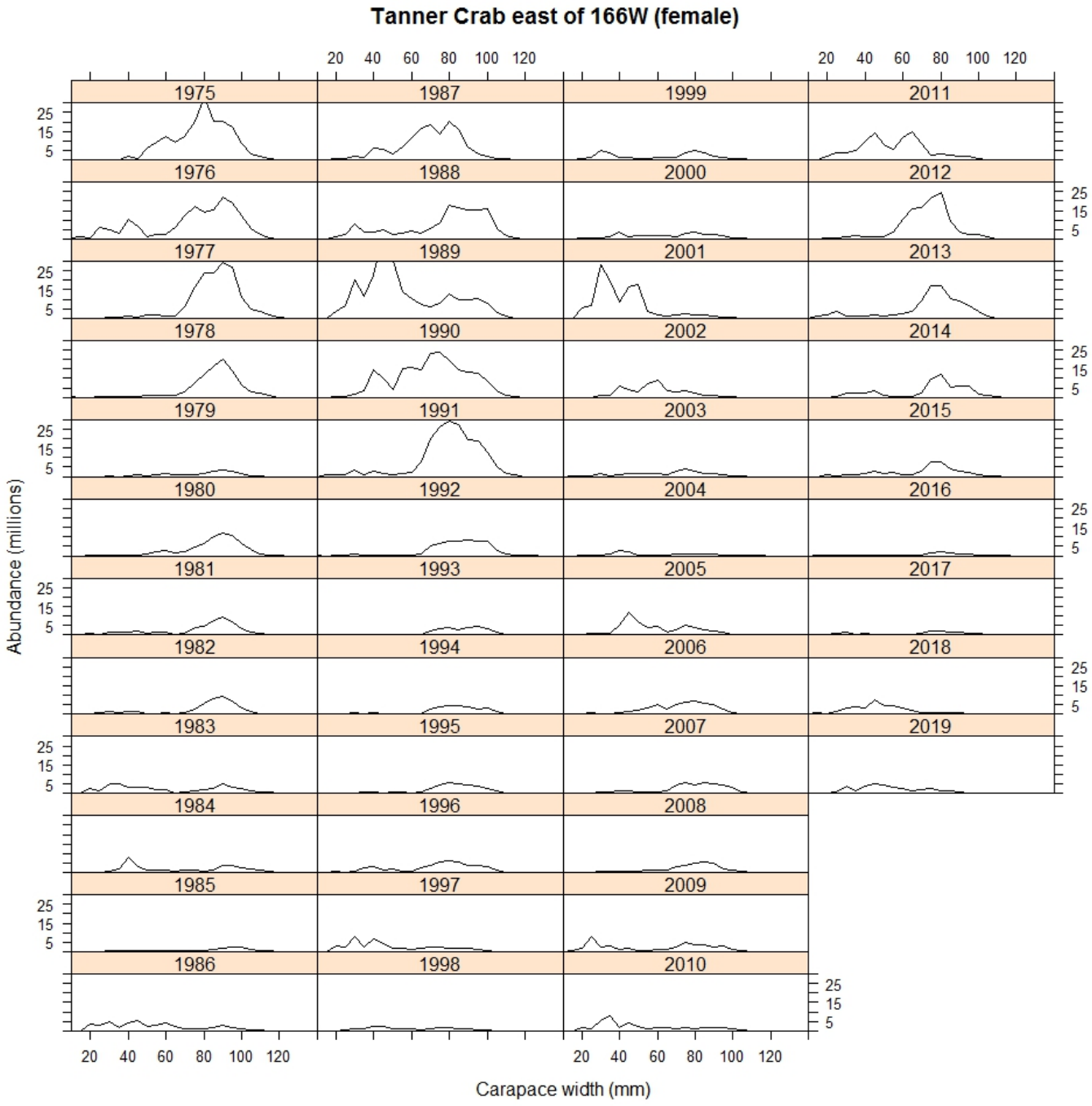


Figure 67. -- Historical size frequency by 5 mm width classes of female Tanner crab (*Chionoecetes bairdi*) east of 166° W, 1975 to 2019.

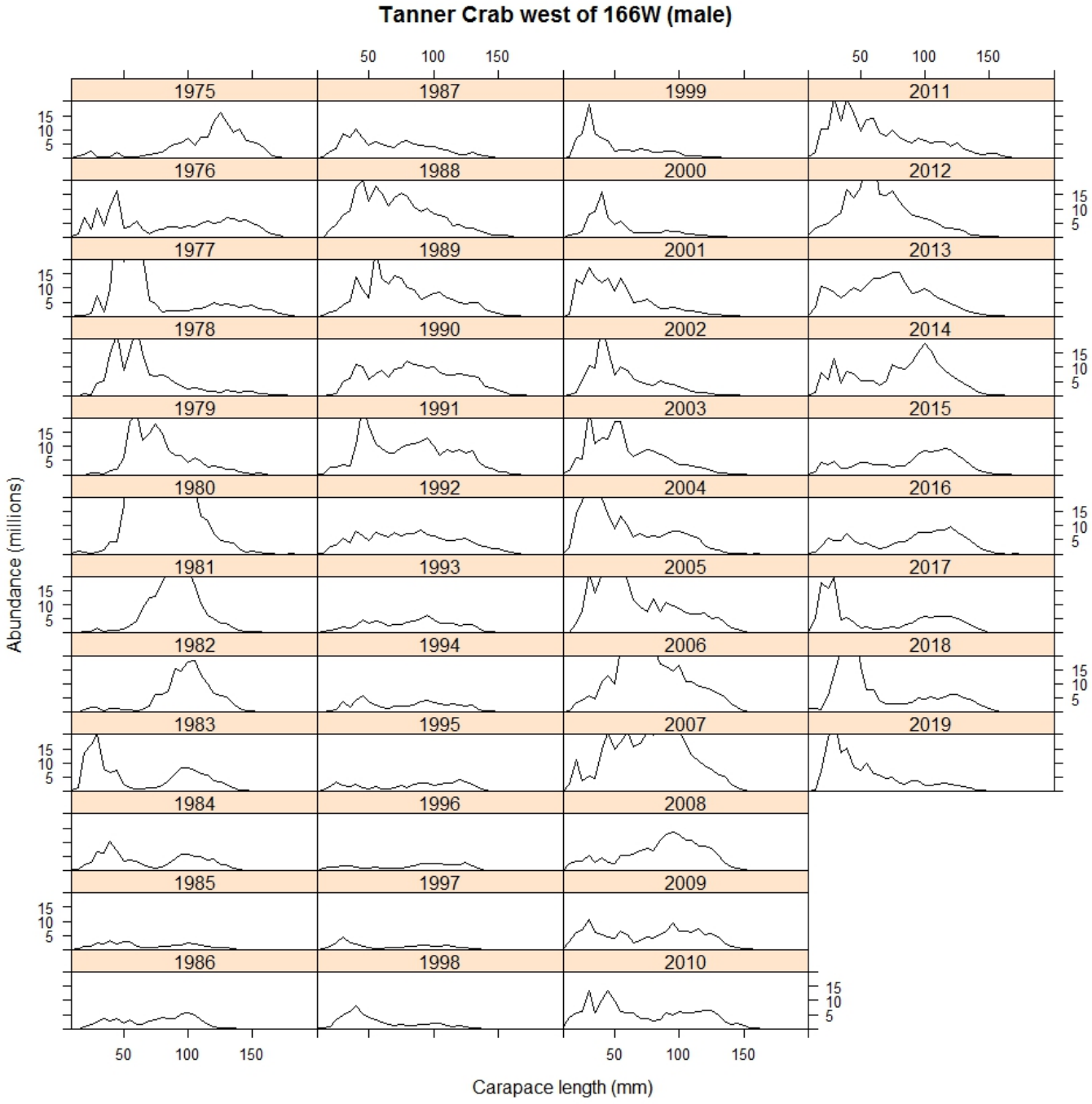


Figure 68. -- Historical size frequency by 5 mm width classes of male Tanner crab (*Chionoecetes bairdi*) west of 166° W, 1975 to 2019.

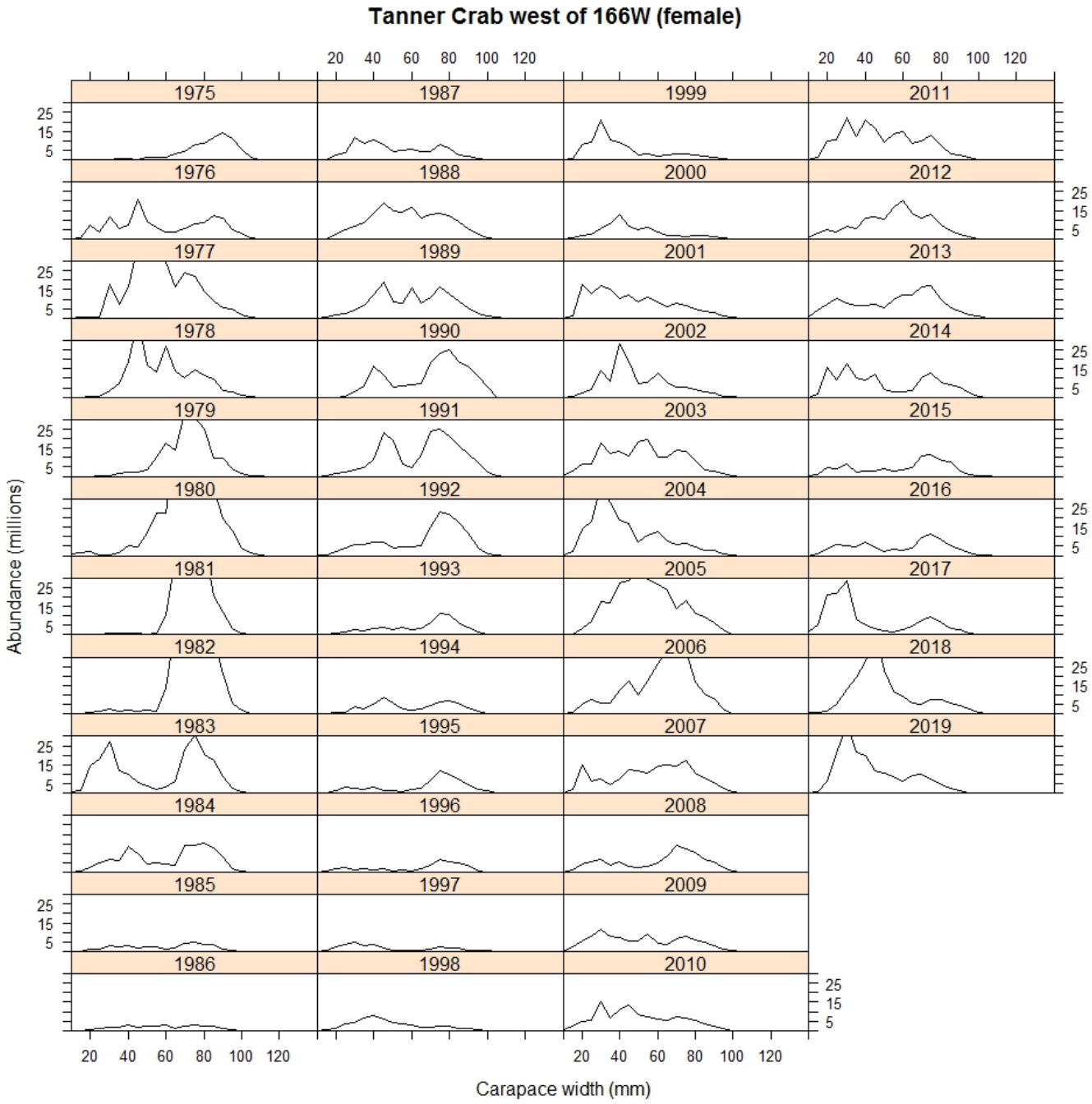


Figure 69. -- Historical size frequency by 5 mm width classes of female Tanner crab (*Chionoecetes bairdi*) west of 166° W, 1975 to 2019.

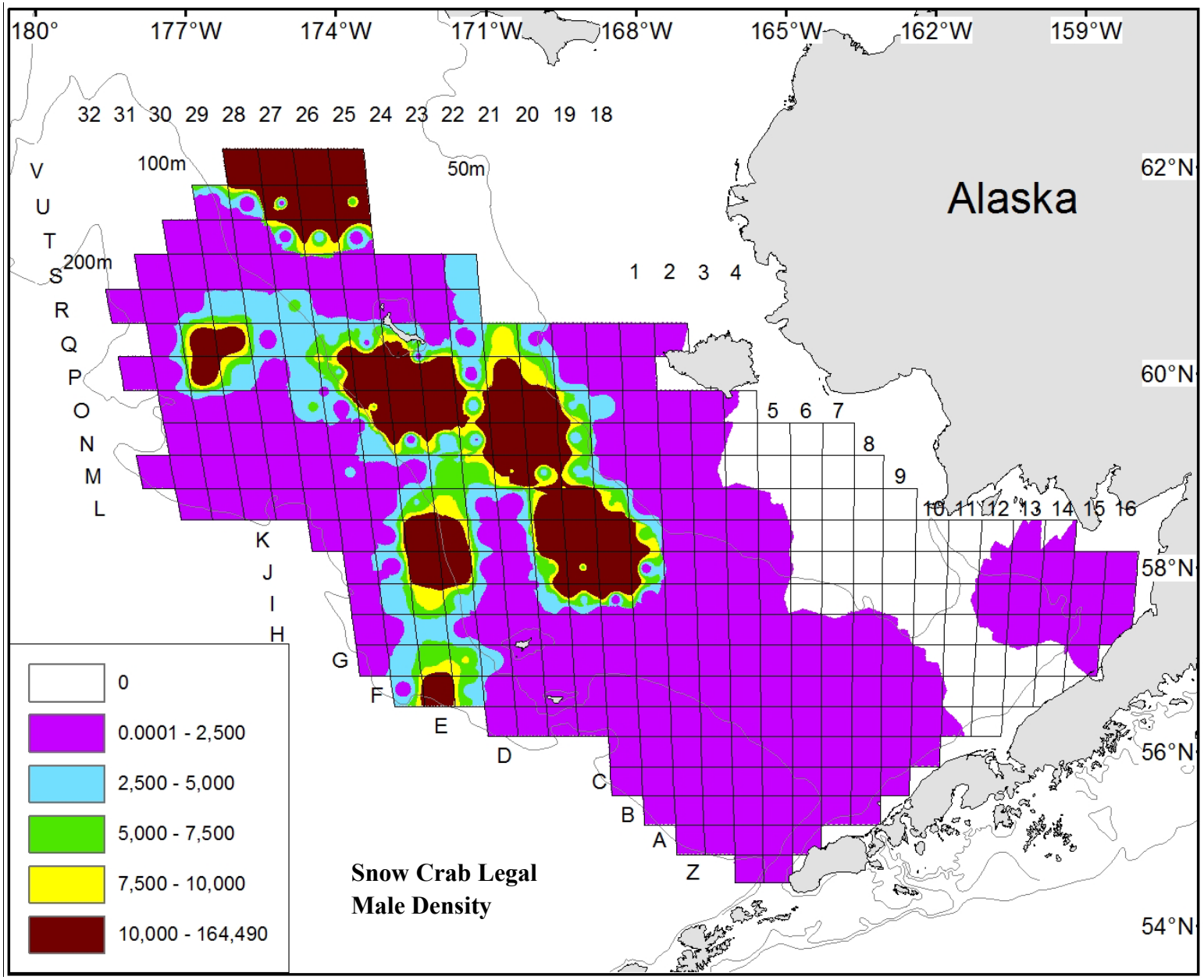


Figure 70. -- Estimated total density (number nmi^{-2}) of legal-sized male snow crab (*Chionoecetes opilio*) at each station sampled in 2019.

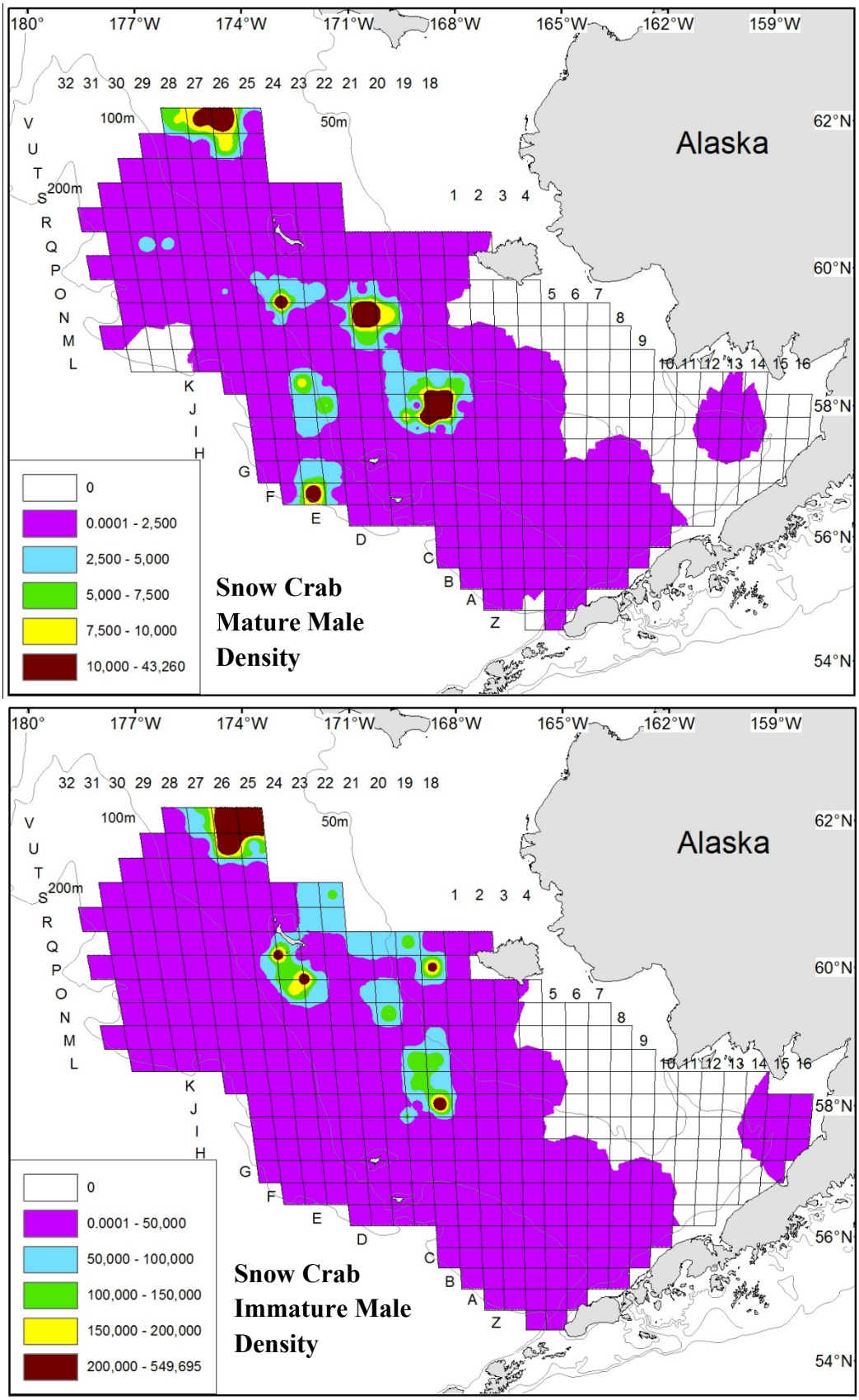


Figure 71. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) snow crab (*Chionoecetes opilio*) at each station sampled in 2019.

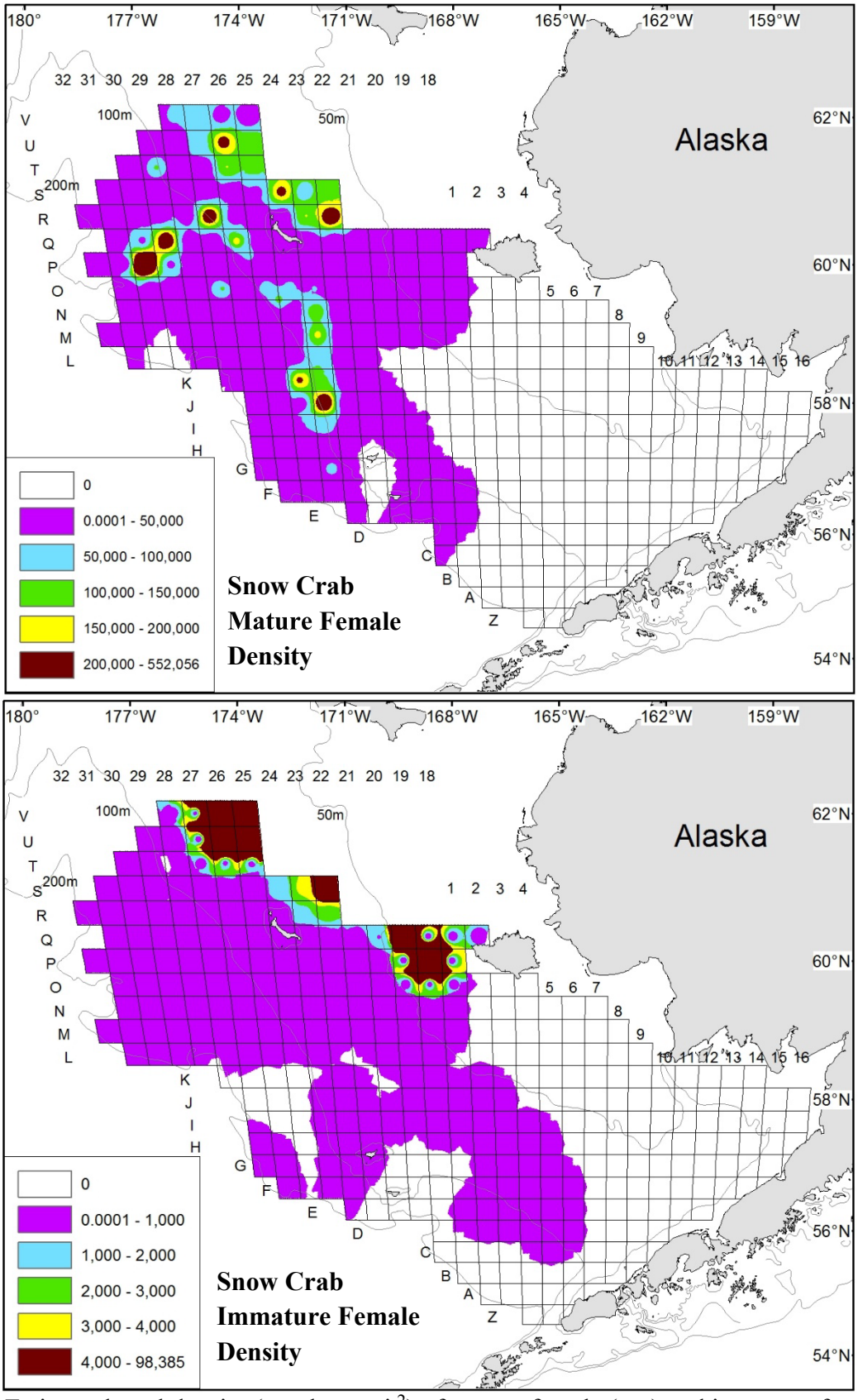


Figure 72. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) snow crab (*Chionoecetes opilio*) at each station sampled in 2019.

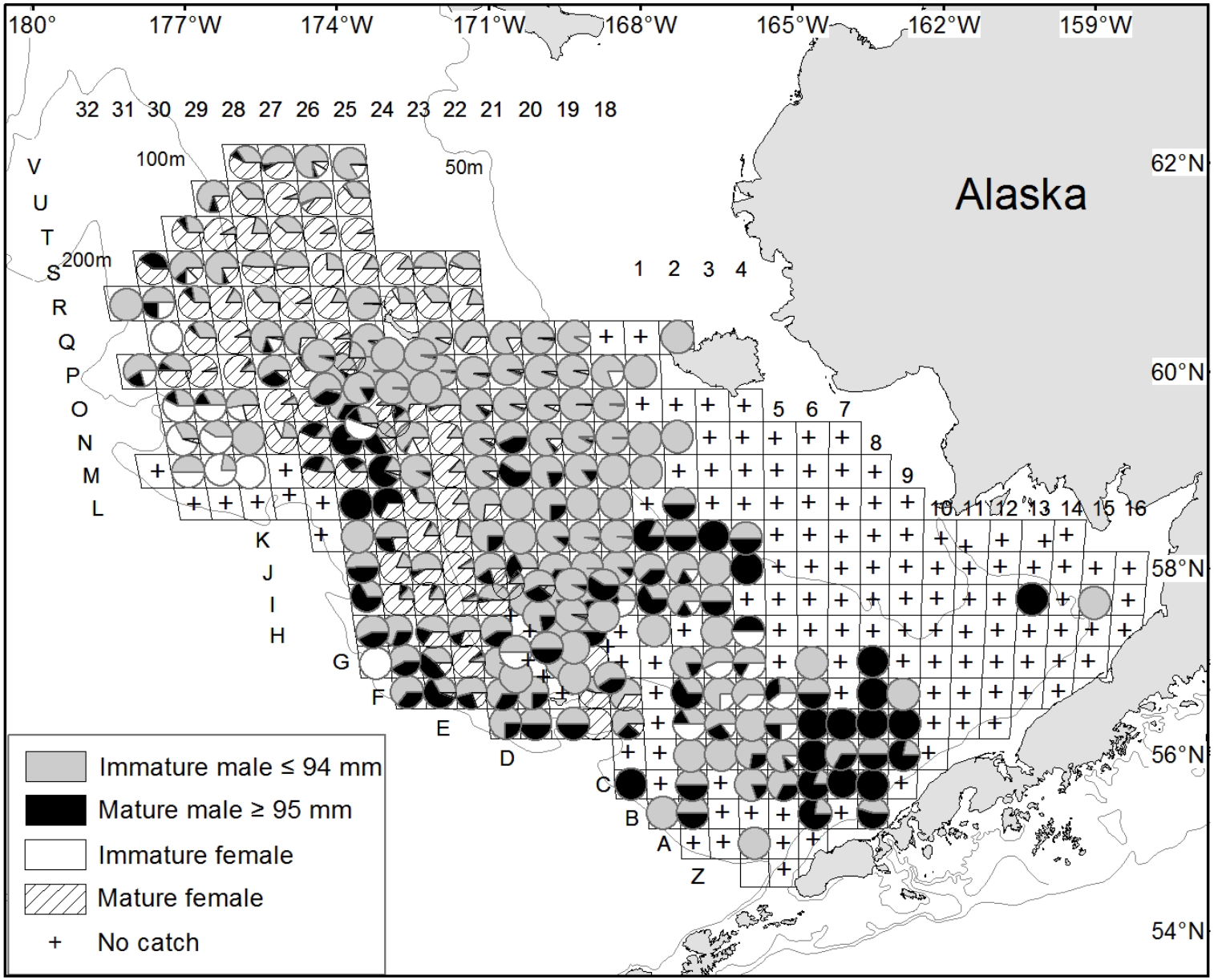


Figure 73. -- Proportion of male and female snow crab (*Chionoecetes opilio*) maturity classes caught at each station sampled in 2019.

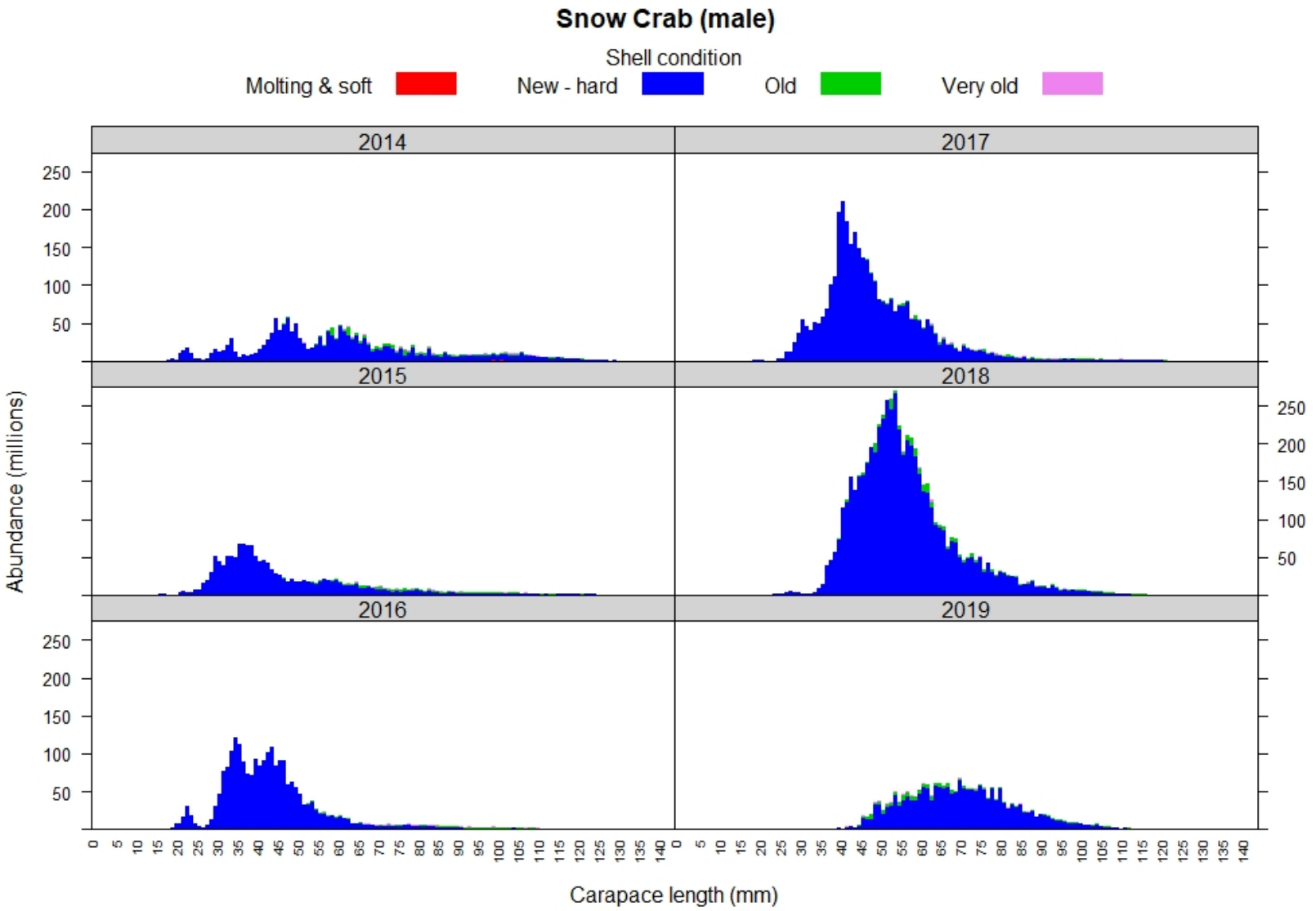


Figure 74. -- Abundance (millions) by size and shell condition of male snow crab (*Chionoecetes opilio*) using 1 mm width classes of all districts combined, 2014-2019.

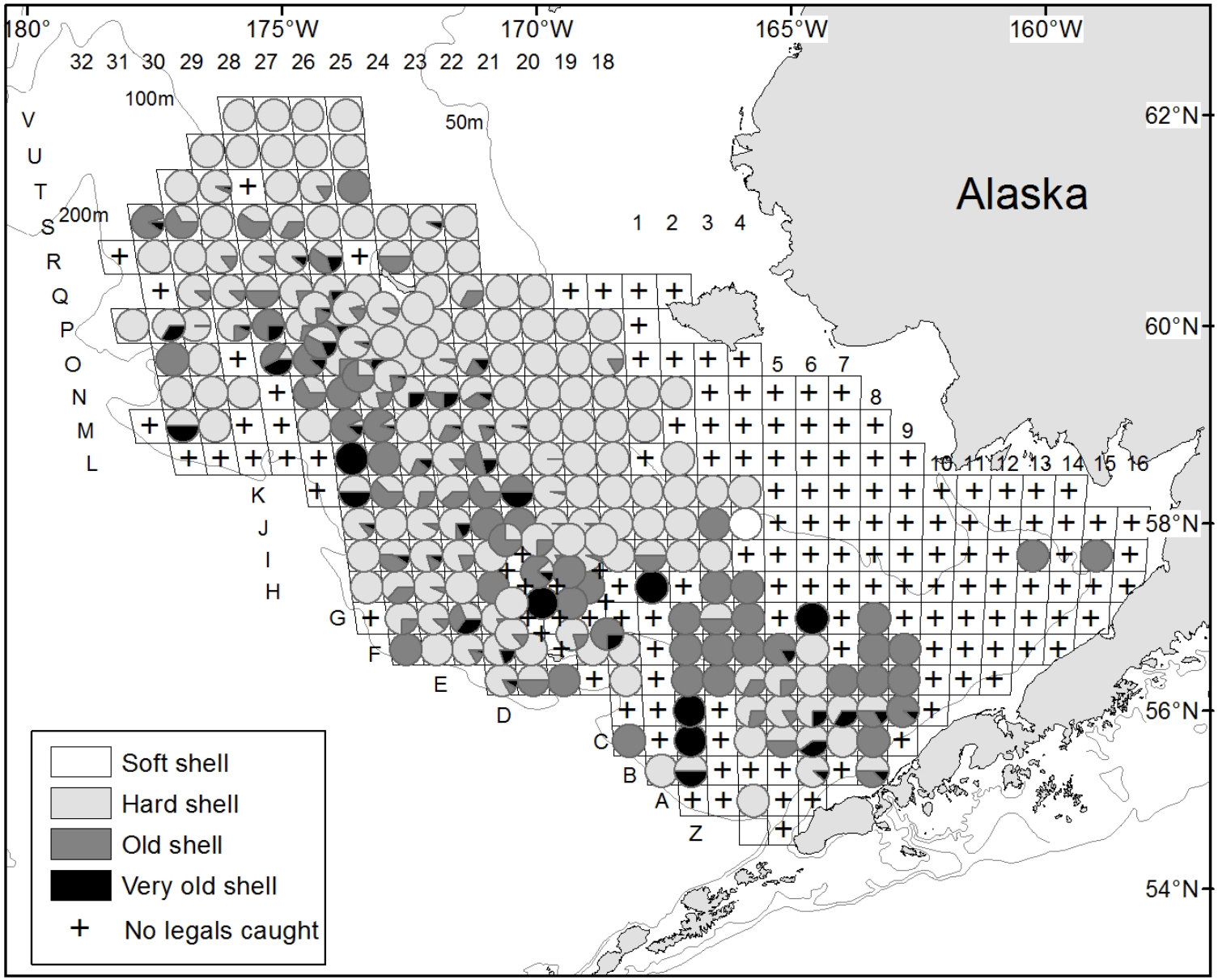


Figure 75. -- Proportion of legal-sized, male snow crab (*Chionoecetes opilio*) shell condition classes caught at each station sampled in 2019.

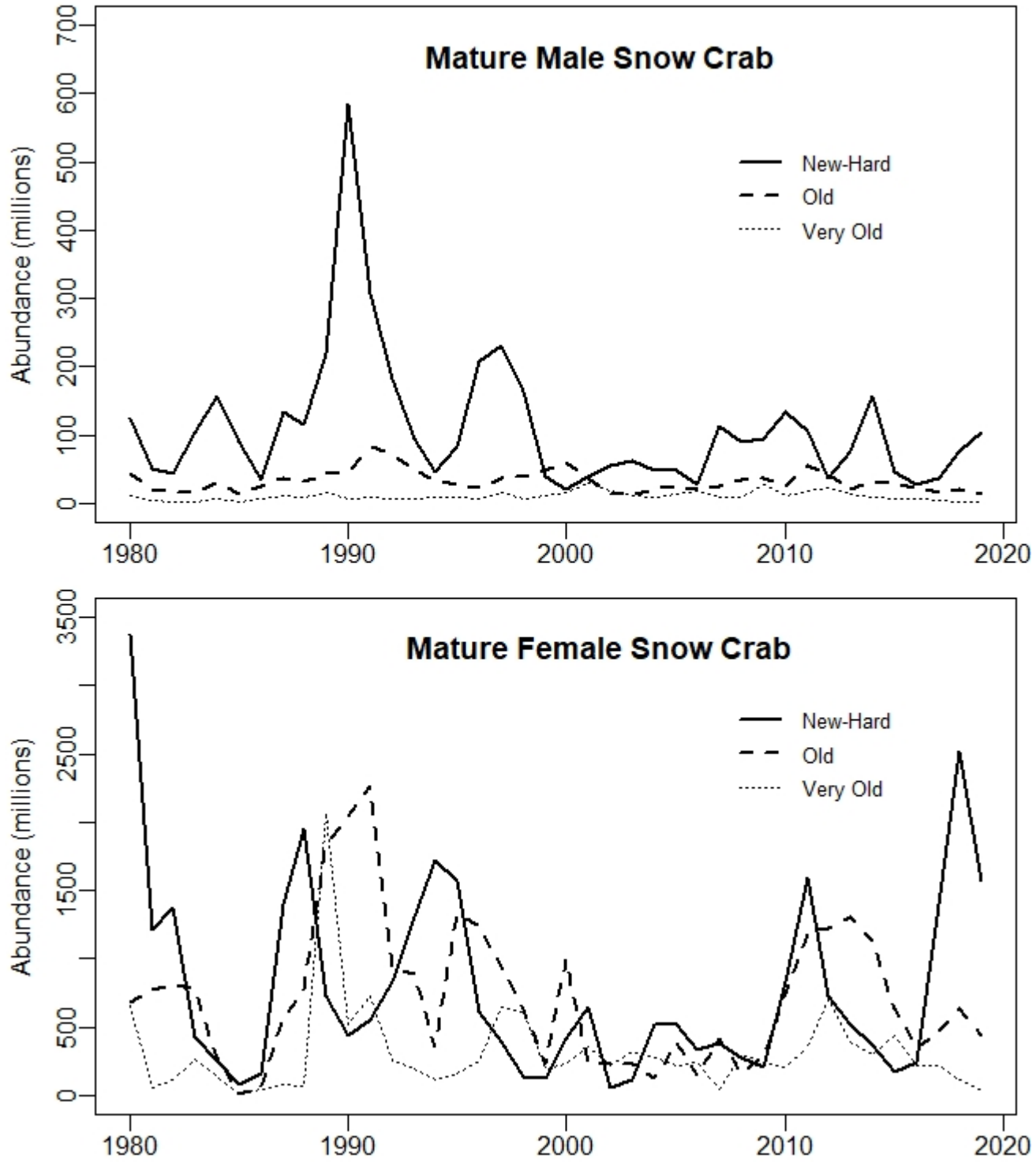


Figure 76. -- Time series of mature male (≥ 95 mm CW) and female (actual maturity) snow crab (*Chionoecetes opilio*) abundance by shell condition, 1980-2019. New- Hard = shell condition 2; Old = shell condition 3; Very Old = shell condition 4 and 5 combined.

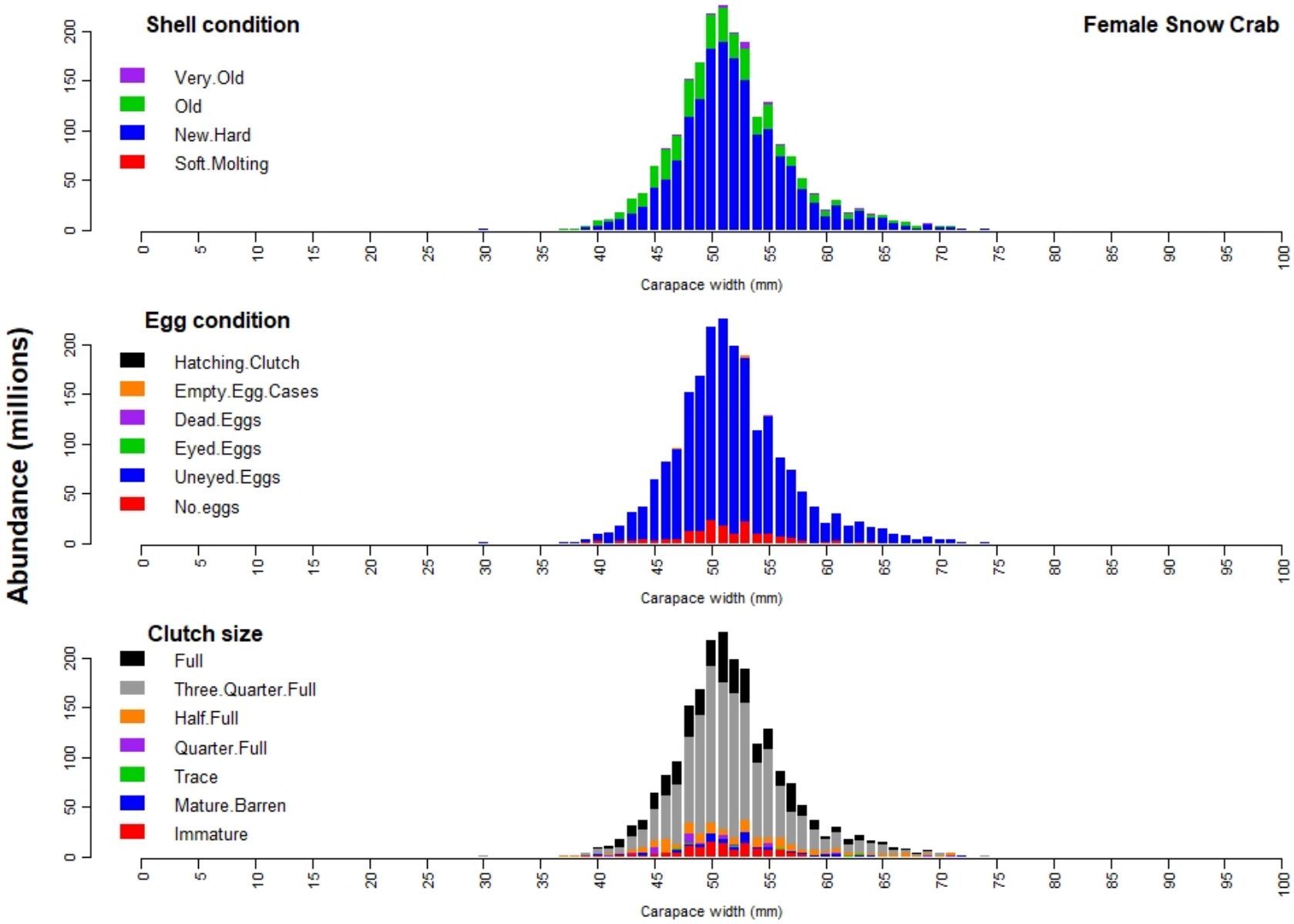


Figure 77. -- Size frequency by shell condition, egg condition, and clutch fullness of female snow crab (*Chionoecetes opilio*) by 1 mm width classes for all districts combined in 2019.

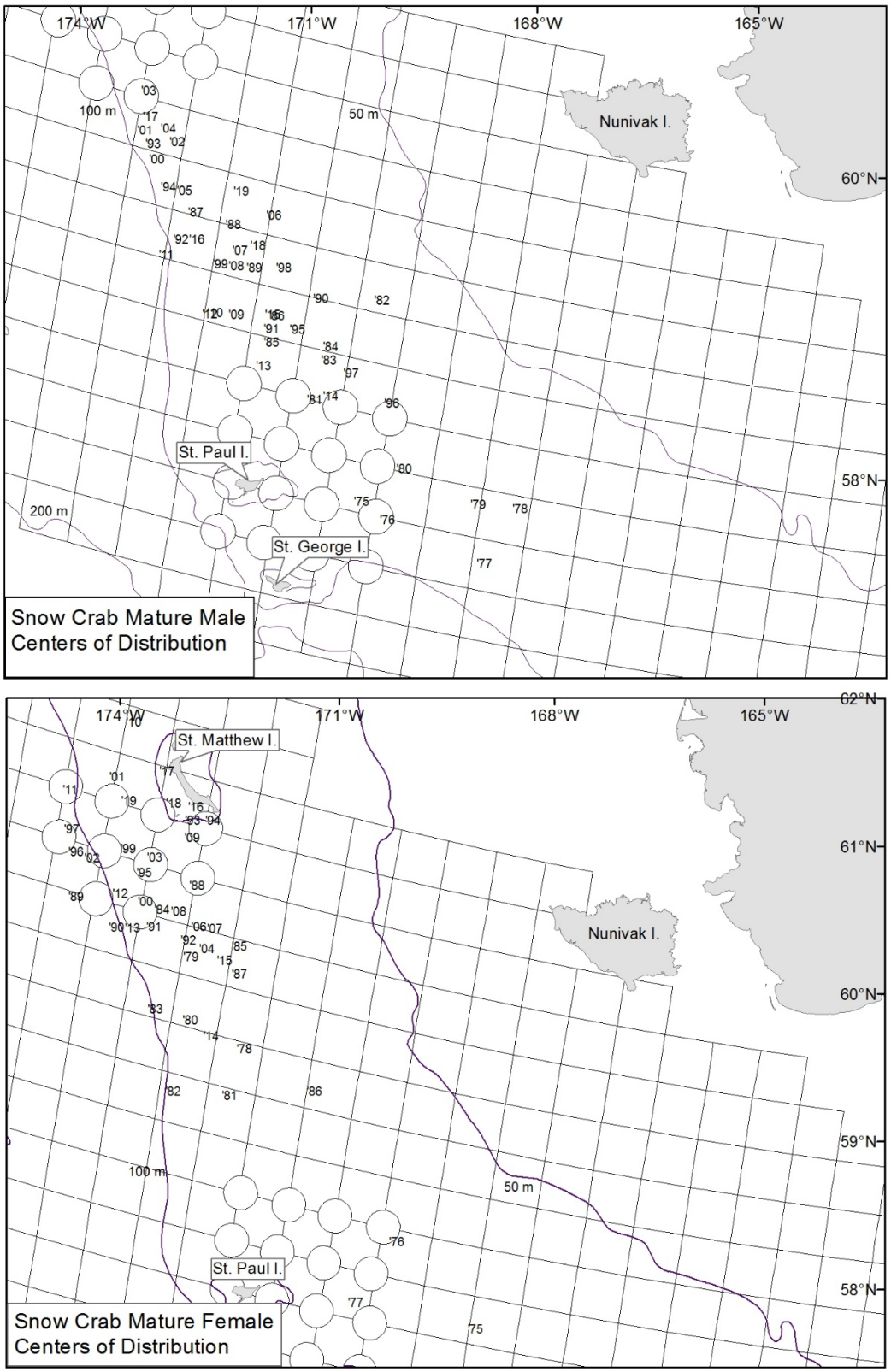


Figure 78. -- Centers of stock distribution of mature male and female snow crab (*Chionoecetes opilio*) from 1975 to 2019.

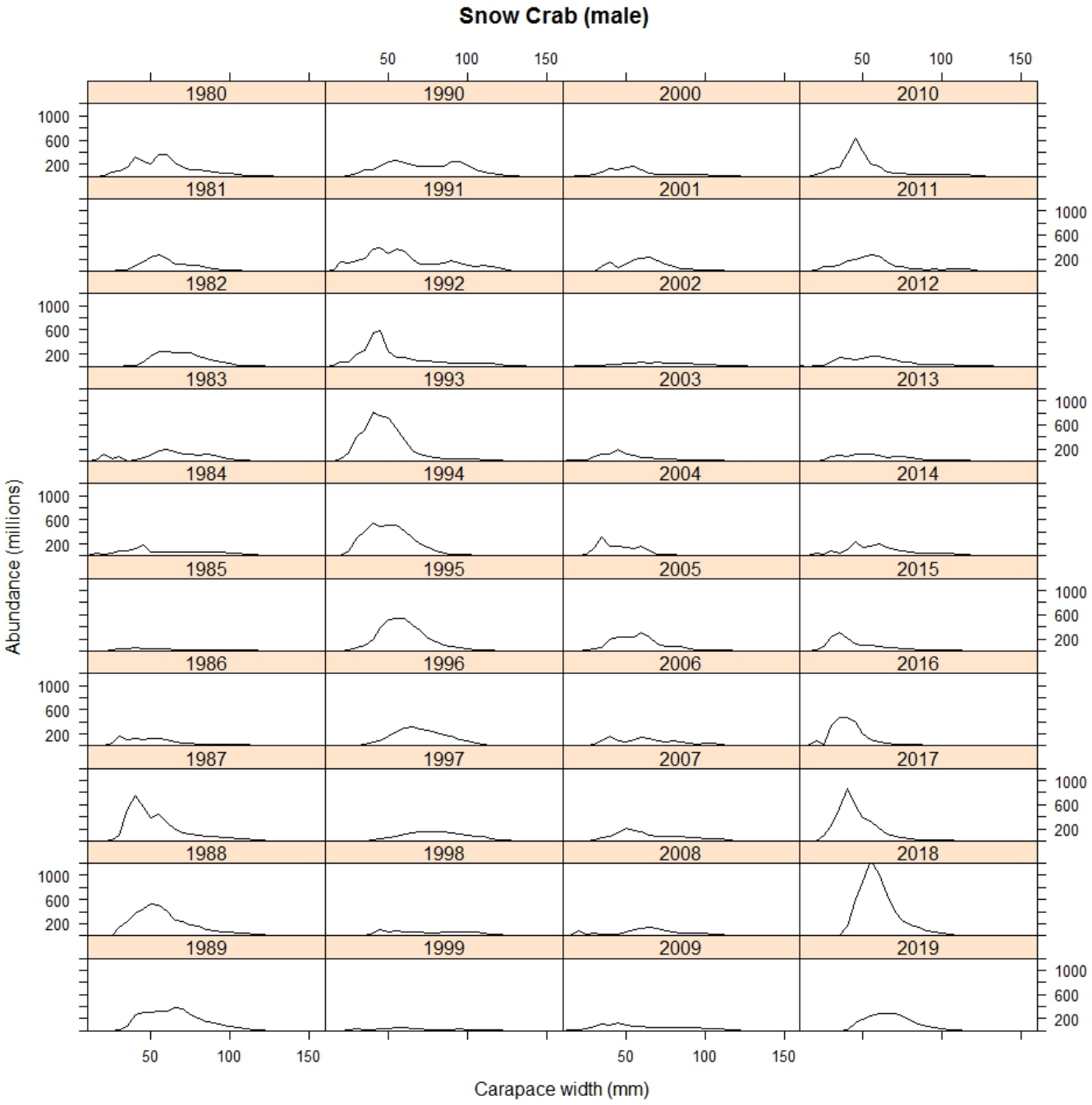


Figure 79. -- Historical size frequency by 5 mm width classes of male snow crab (*Chionoecetes opilio*), 1980 to 2019.

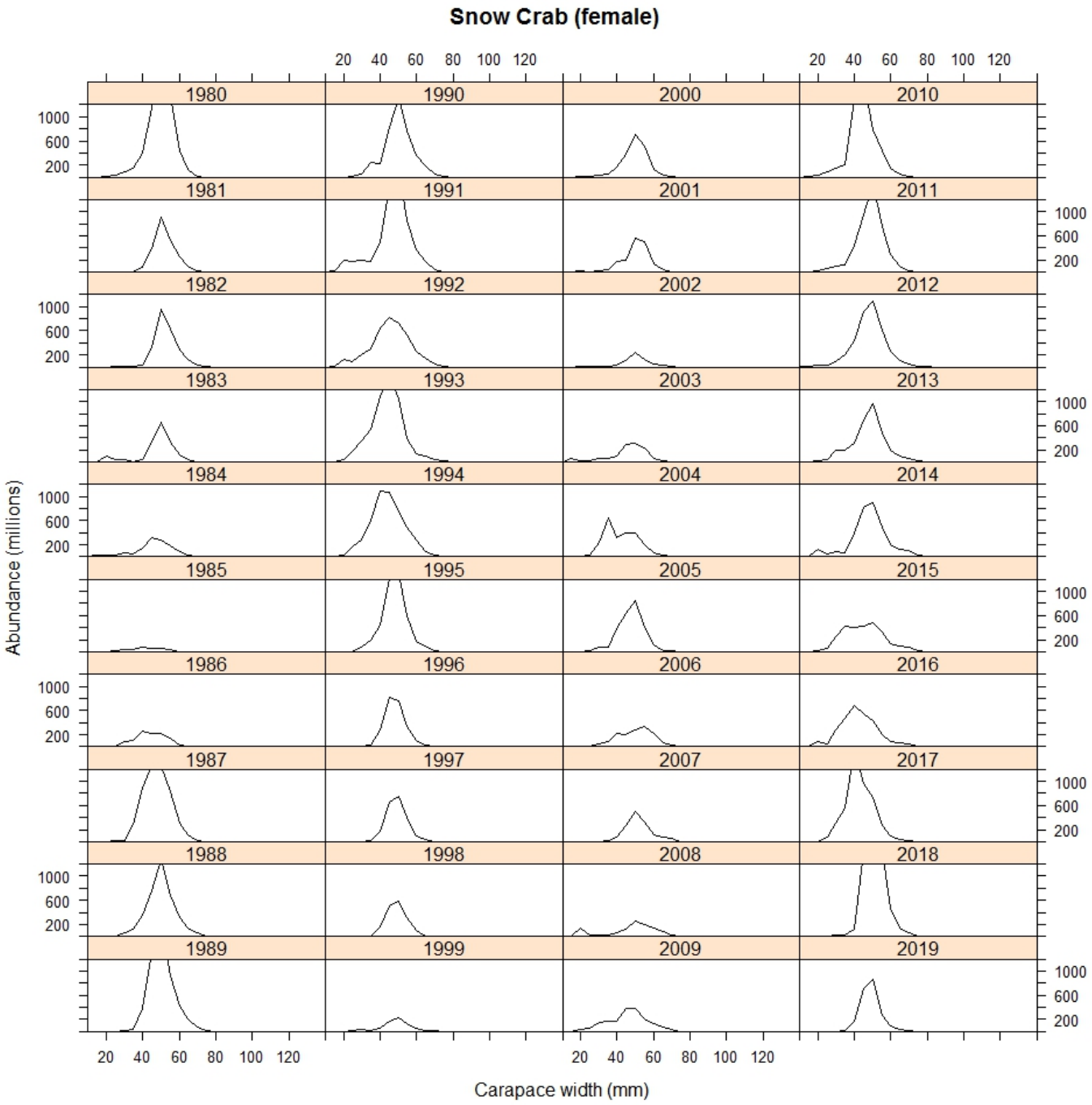


Figure 80. -- Historical size frequency by 5 mm width classes of female snow crab (*Chionoecetes opilio*), 1980 to 2019.

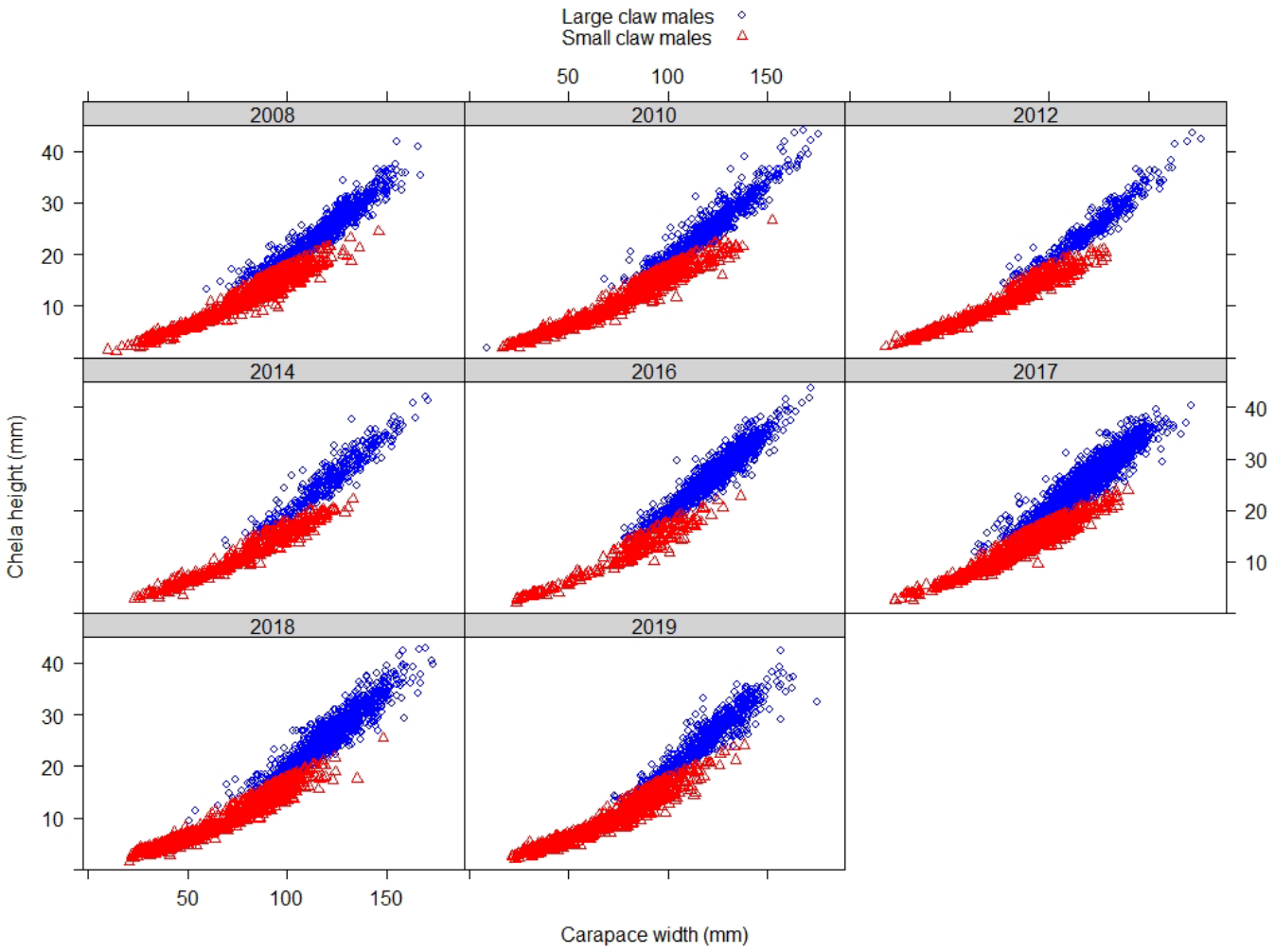


Figure 81a. -- Male Tanner crab (*Chionoecetes bairdi*) chela height and carapace width measurements collected during the 2008, 2010, 2012, 2014, 2016, 2017, 2018, and 2019 (all years combined, n = 14,564) eastern Bering Sea bottom trawl surveys. Maturity classification on the basis of being large claw or small claw, with cutline at chela height/carapace width = 0.18.

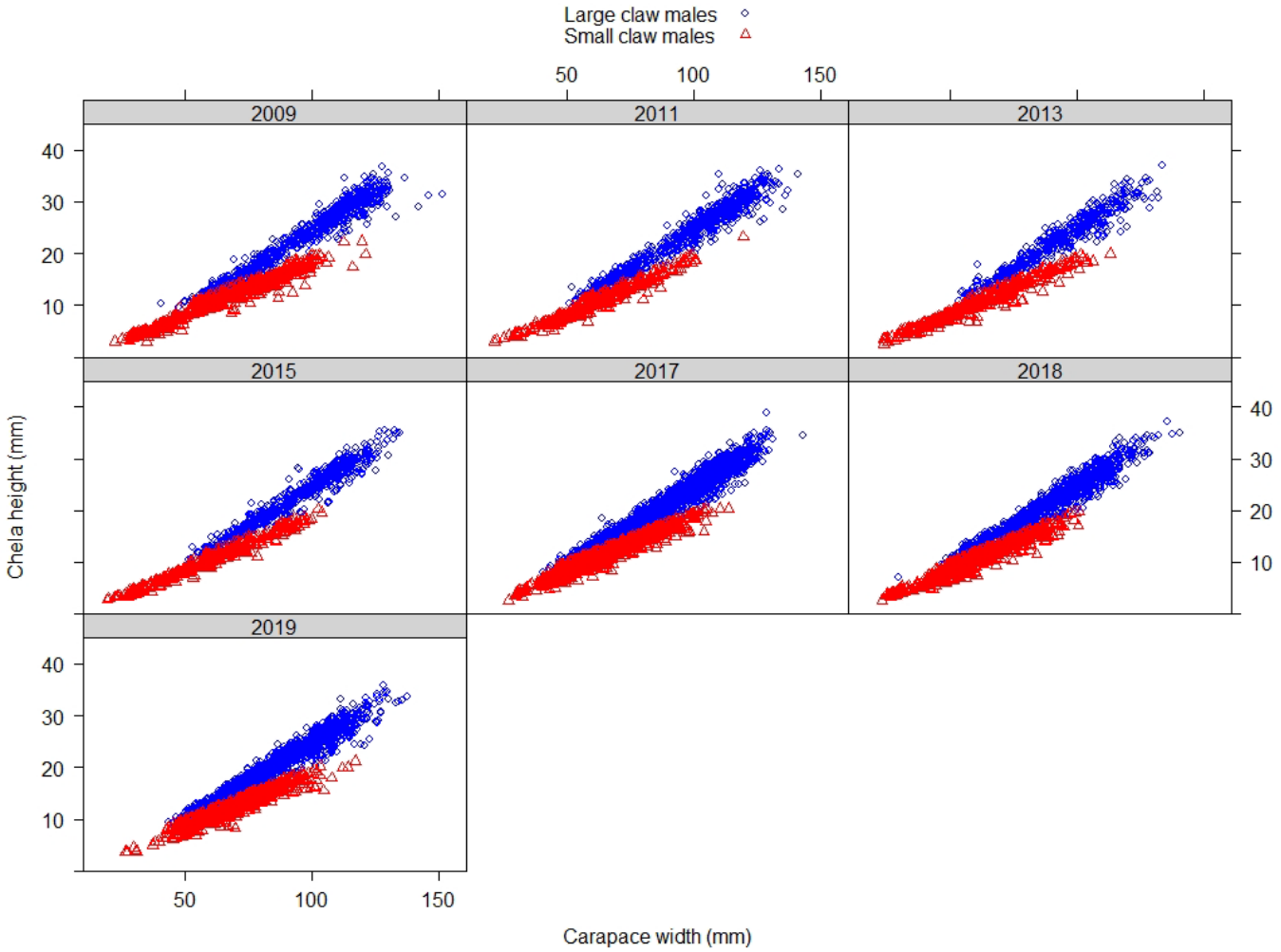


Figure 81b. --Male snow crab (*Chionoecetes opilio*) chela height and carapace width measurements collected during the 2009, 2011, 2013, 2015, 2017, 2018, and 2019 (all years combined, n = 11,730) eastern Bering Sea bottom trawl surveys. Maturity classification on the basis of being large claw or small claw, with cutline at chela height/carapace width = 0.20.

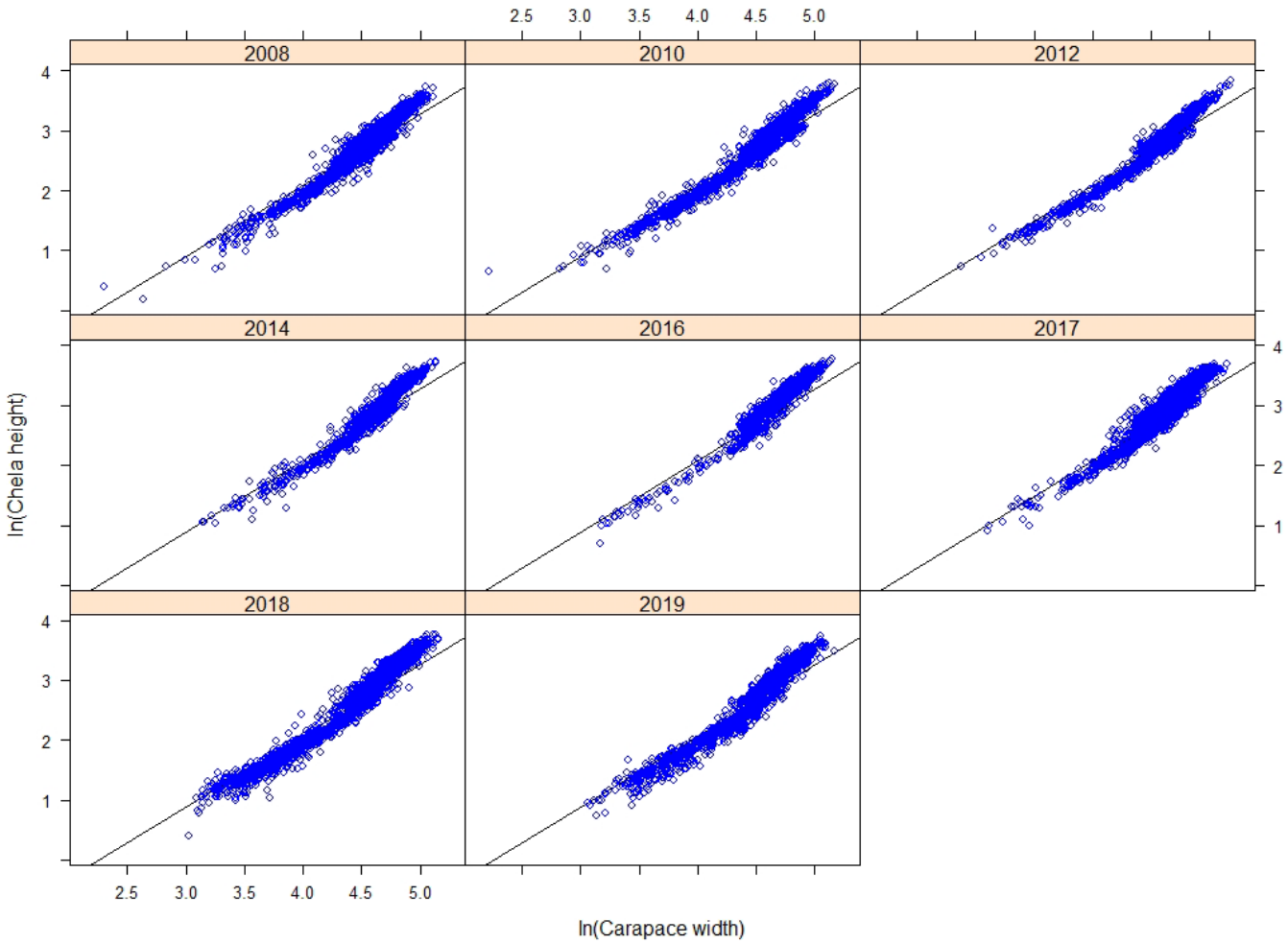


Figure 82a. -- Male Tanner crab (*Chionoecetes bairdi*) chela height and carapace width measurements collected during the 2008, 2010, 2012, 2014, 2016, 2017, 2018, and 2019 (all years combined, n = 14,564) eastern Bering Sea bottom trawl surveys. Measurements are natural log-linearized. Black line is maturity cutline derived using distribution-based approach

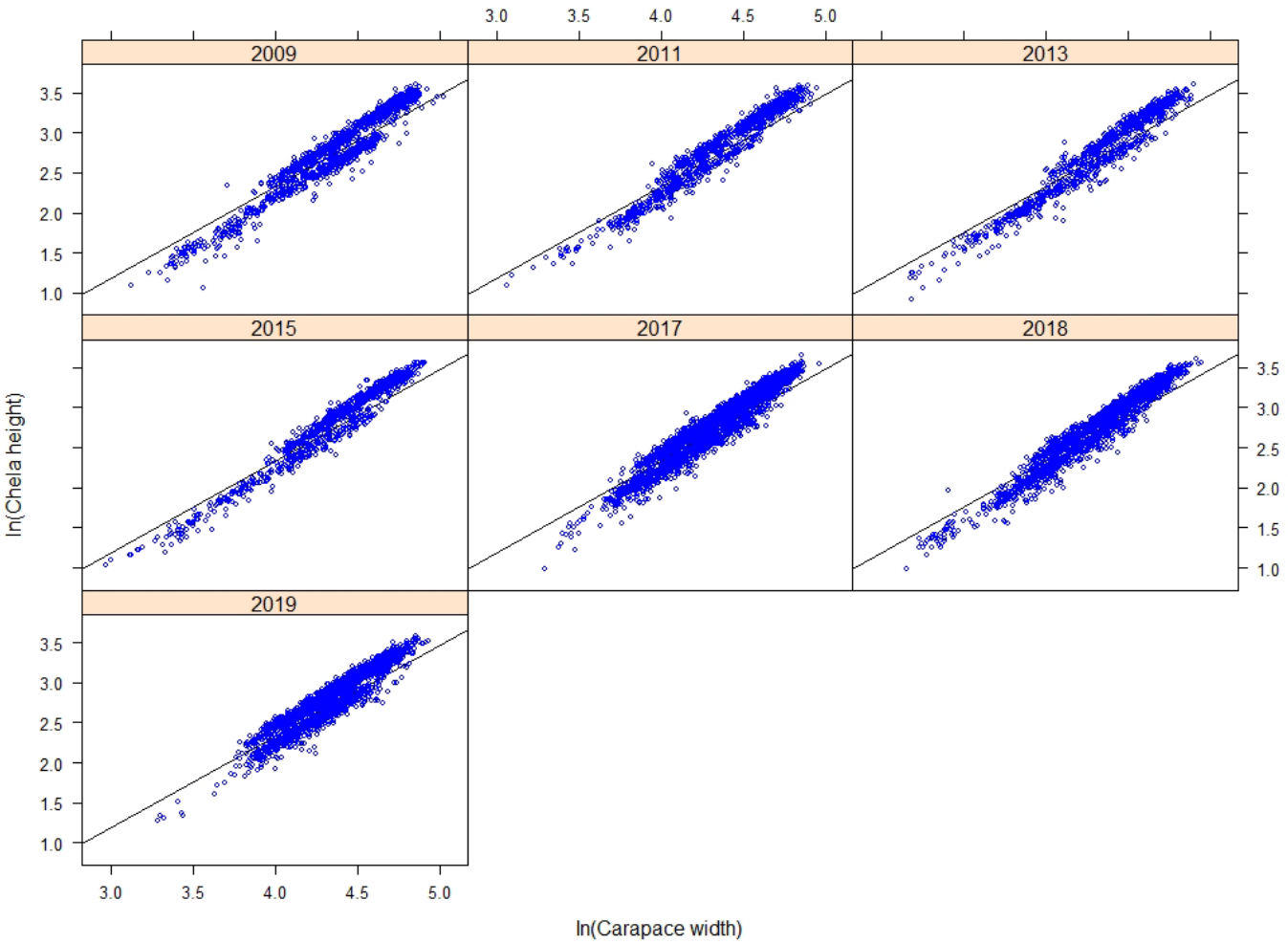


Figure 82b. --Male snow crab (*Chionoecetes opilio*) chela height and carapace width measurement collected during the 2009, 2011, 2013, 2015, 2017, 2018, and 2019 (all years combined, n = 11,730) eastern Bering Sea bottom trawl surveys. Measurements are natural log-linearized. Black line is maturity cutline derived using distribution-based approach.

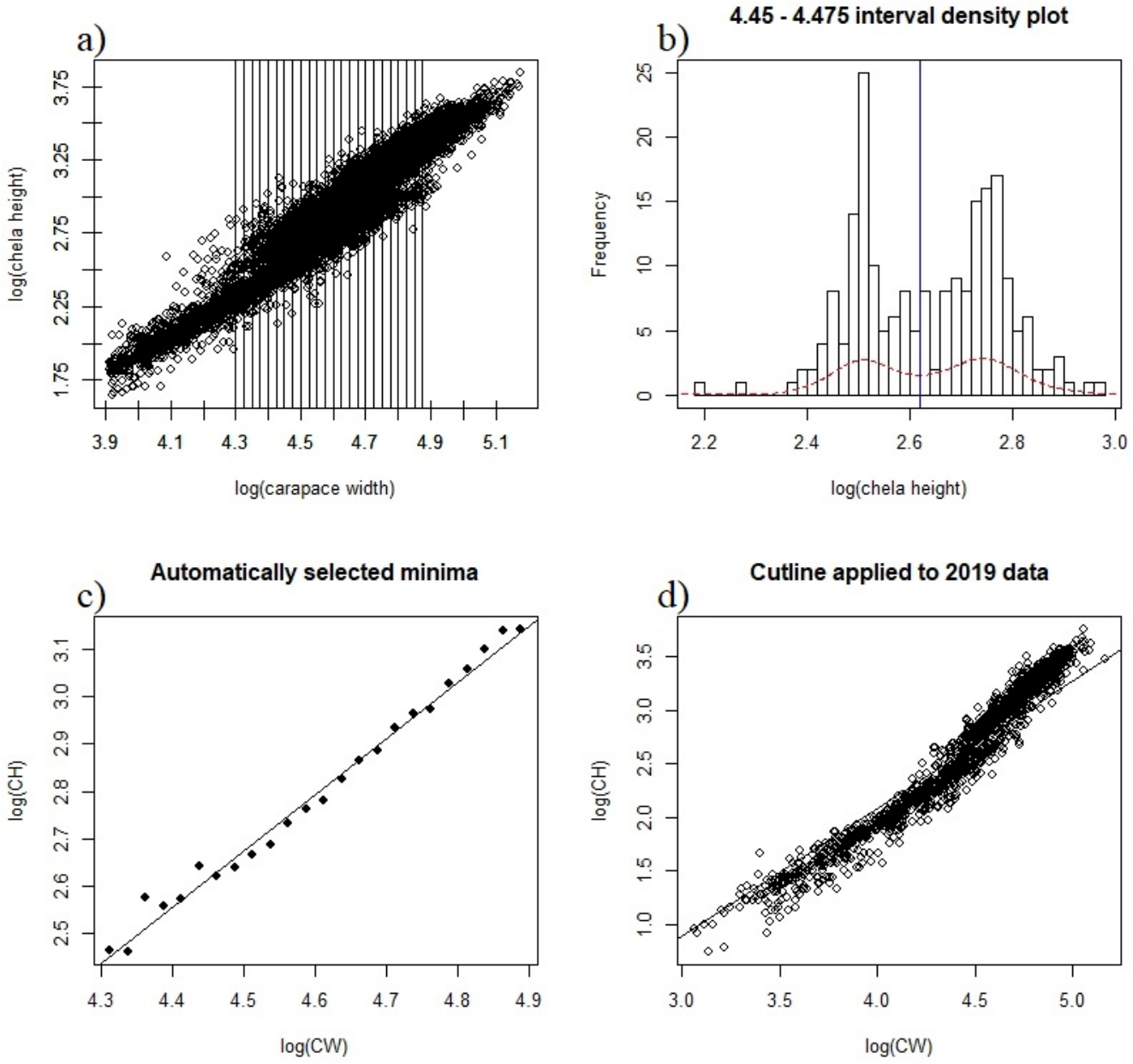


Figure 83. -- Example plots from development of distribution-based maturity classification approach; a.) combined data for Tanner crab from 2008, 2010, 2012, 2014, 2016, 2017, 2018, and 2019, with intervals (vertical black lines) applied, b.) Example distribution, derived from the log (carapace width) = 4.45 – 4.475 interval, with distribution minima (blue line), c.) plotted minima from all intervals, with fitted linear regression line, d.) linear regression line applied to 2019 Tanner crab data as a maturity cutline.

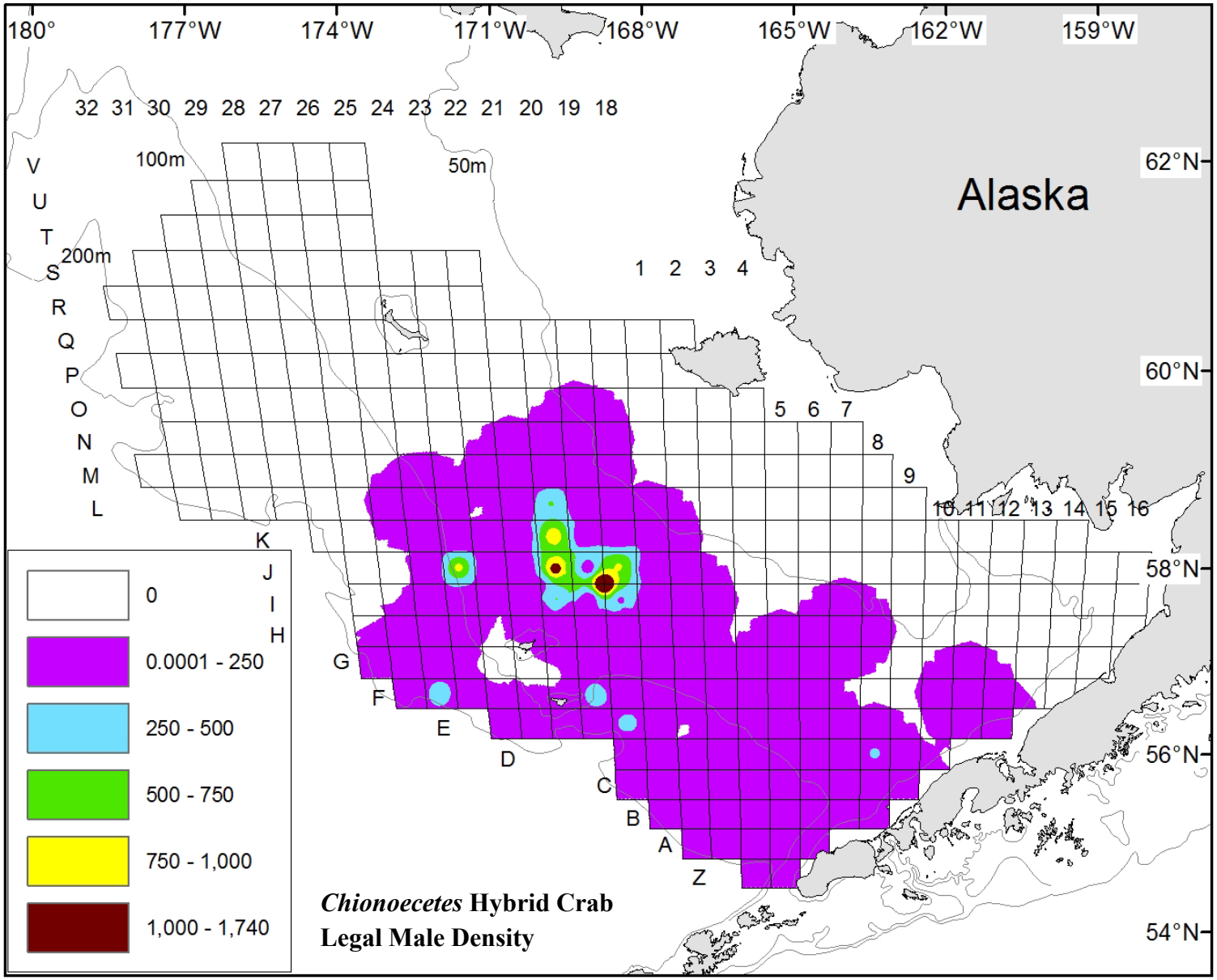


Figure 84. -- Estimated total density (number nmi^{-2}) of legal-sized male *Chionoecetes* spp. hybrid crab at each station sampled in 2019 using *C. opilio* legal size definition (legal size ≥ 78 mm).

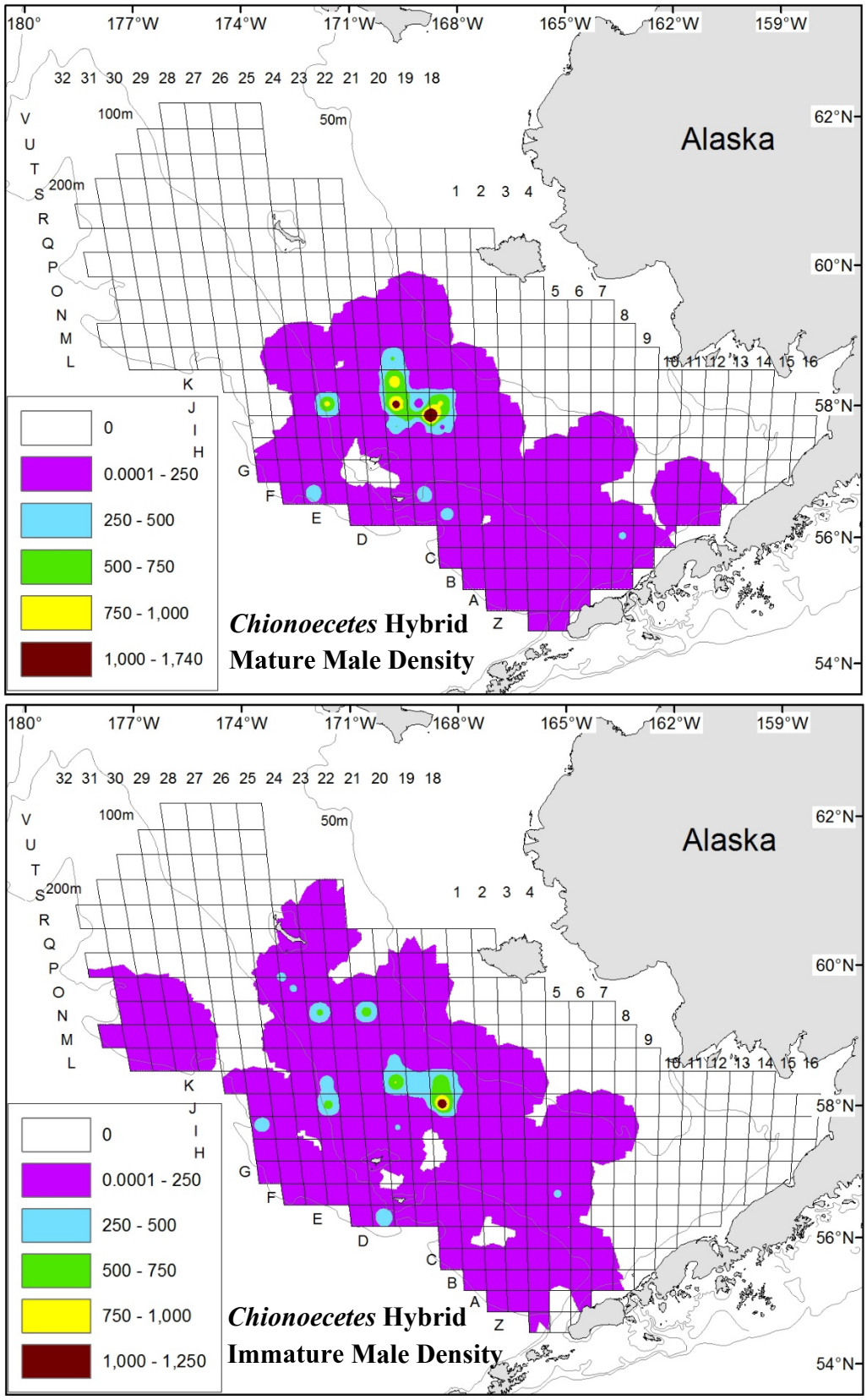


Figure 85. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) *Chionoecetes* spp. hybrid crab at each station sampled in 2019 using *C. opilio* mature size definitions (mature male ≥ 95 mm).

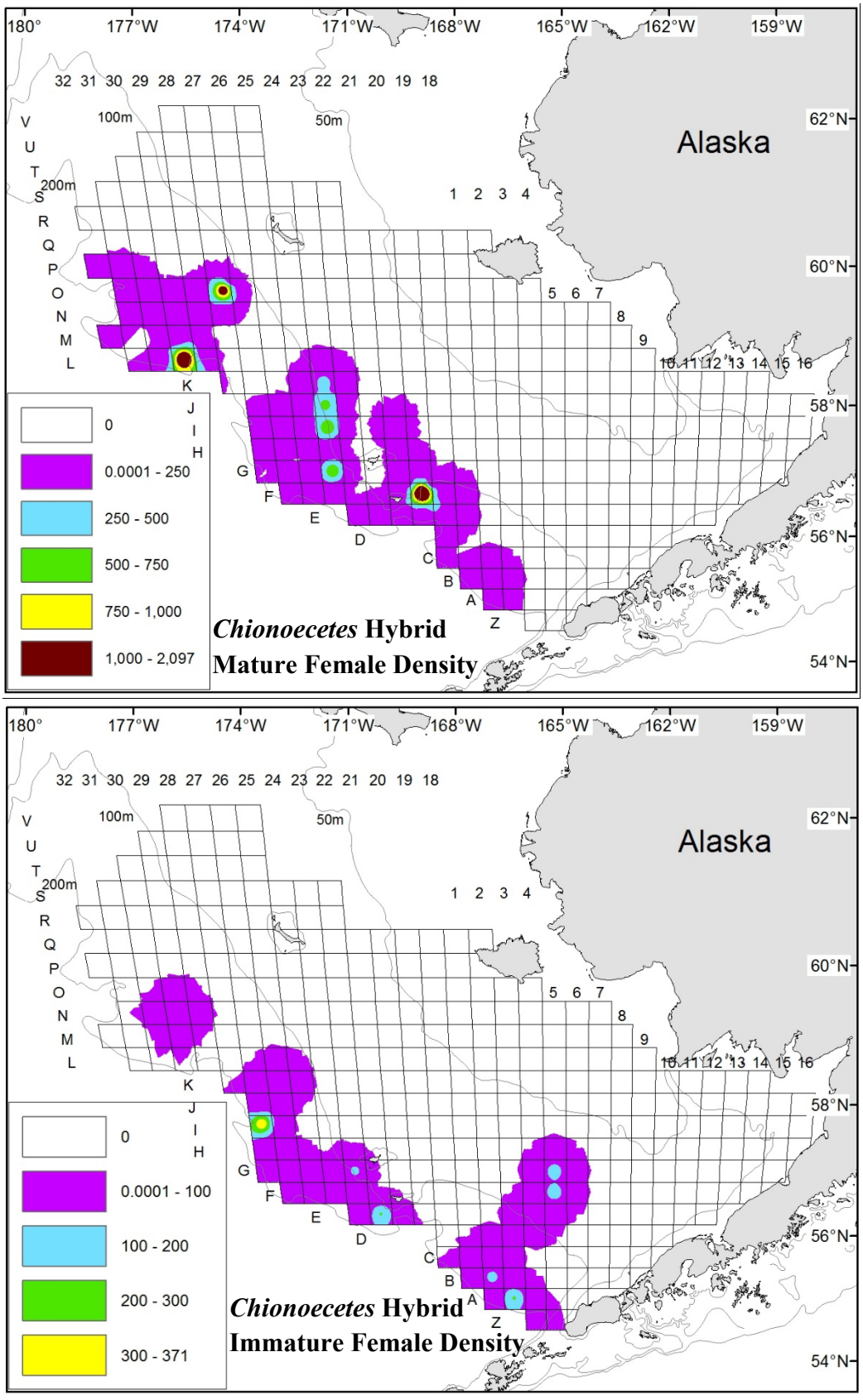


Figure 86. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) *Chionoecetes* spp. hybrid crab at each station sampled in 2019.

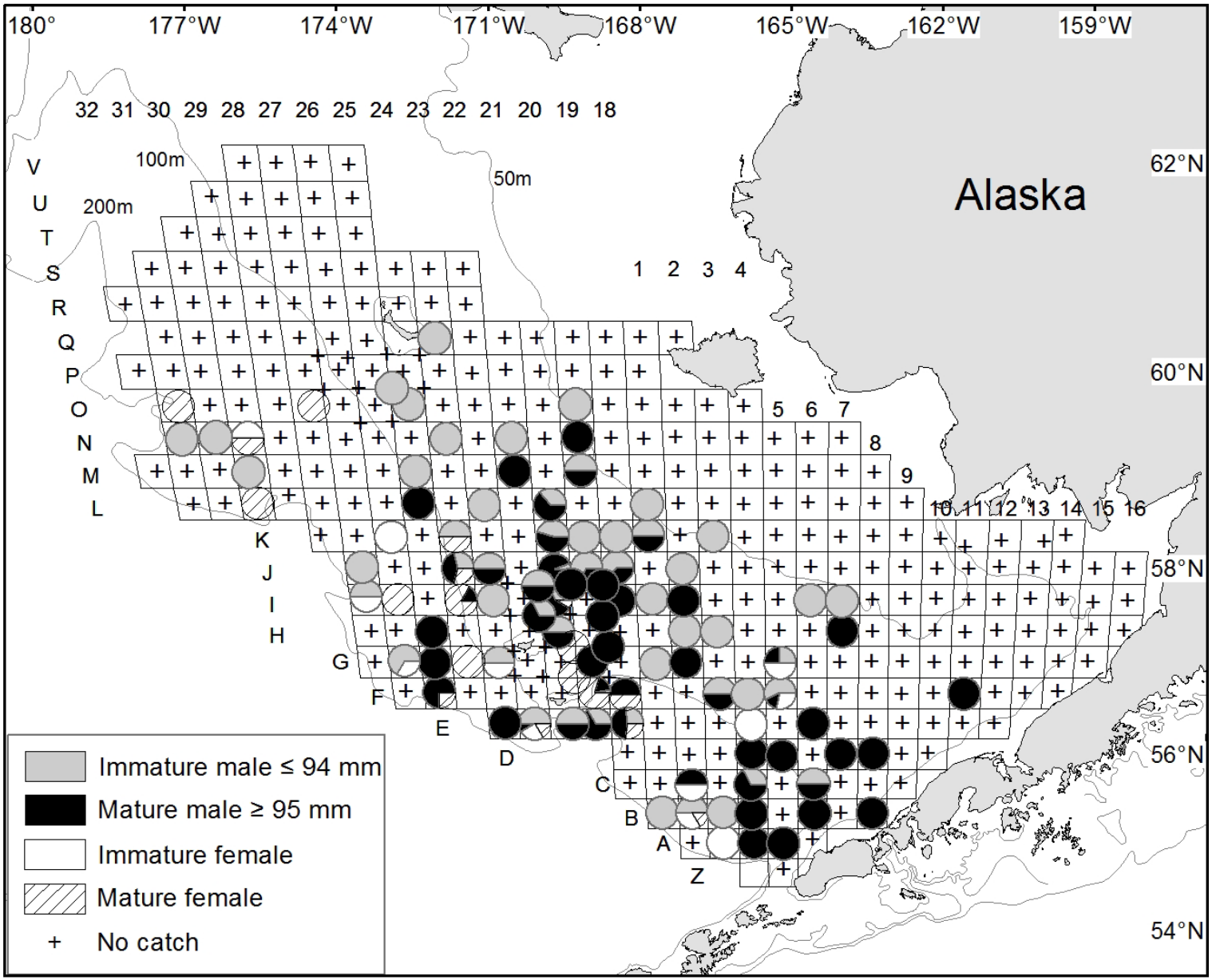


Figure 87. -- Proportion of male and female *Chionoecetes* spp. hybrid crab maturity classes caught at each station sampled in 2019.

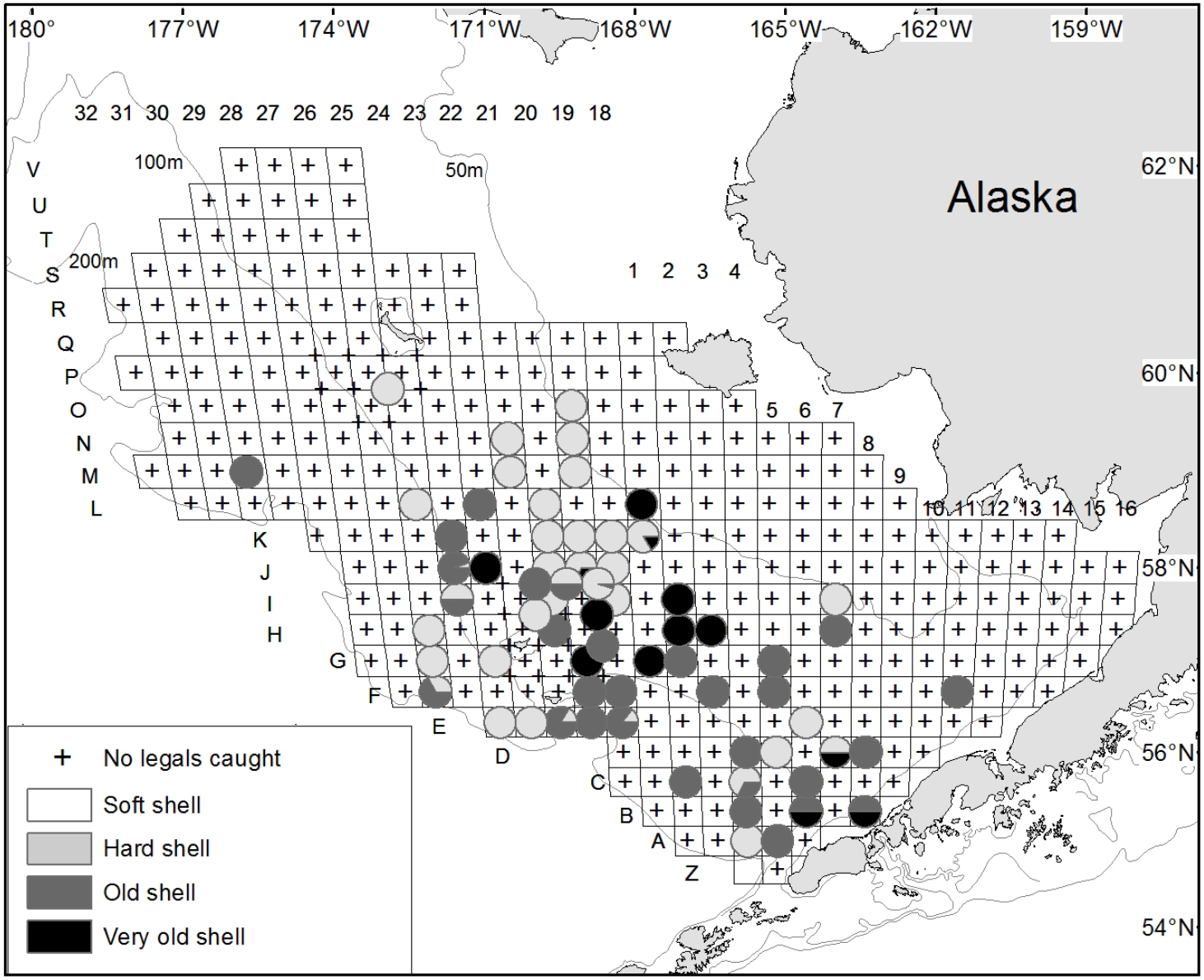


Figure 88. -- Proportion of legal-sized, male *Chionoecetes* spp. hybrid crab shell condition classes caught at each station sampled in 2019 using the *C. opilio* legal size definition (legal size ≥ 78 mm).

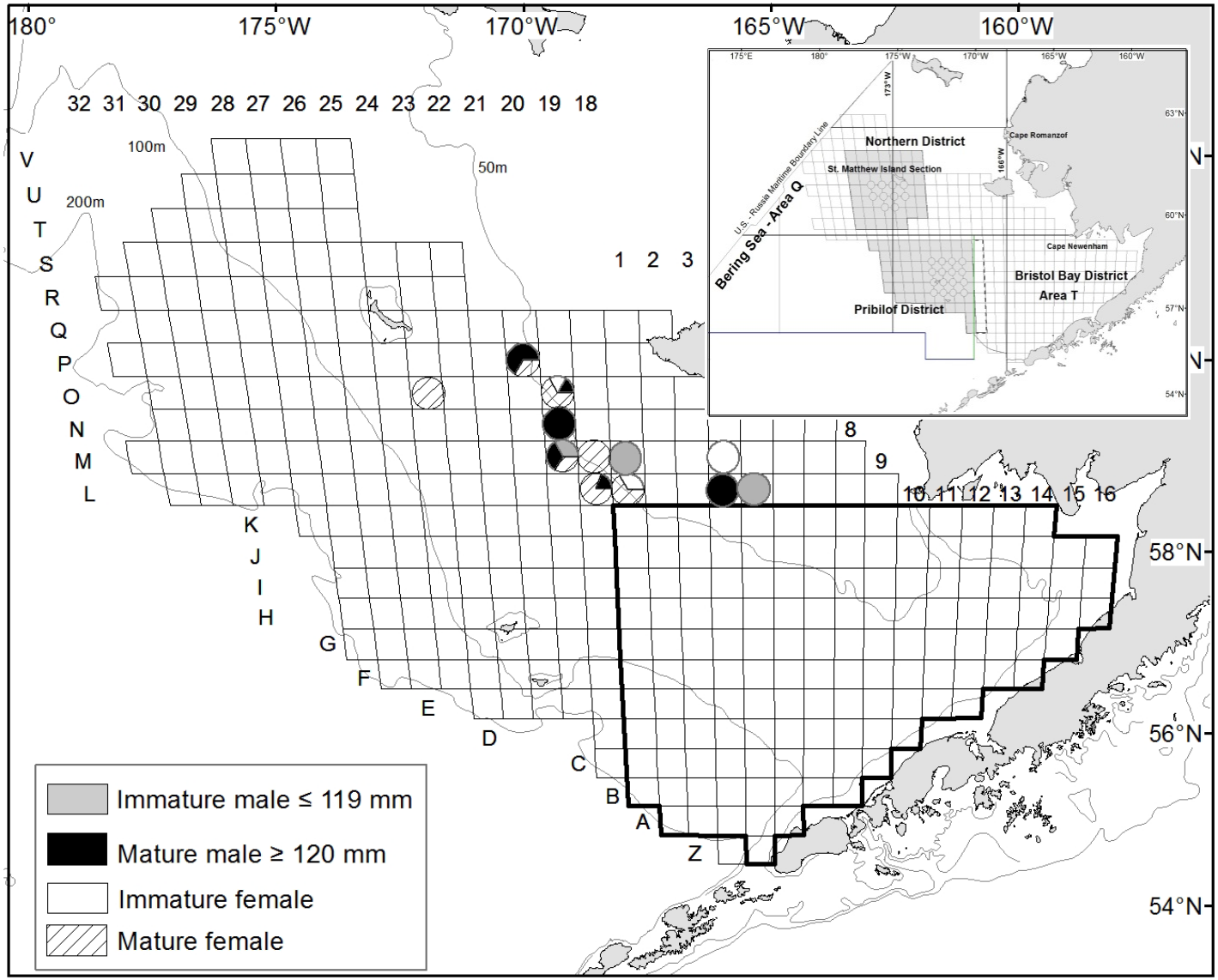


Figure 89. -- Proportion of male and female red king crab (*Paralithodes camtschaticus*) maturity classes caught at each station sampled in 2019 in the Northern District. The Northern District is an ADF&G commercial crab management unit in the northern section of the eastern Bering Sea, see inset.

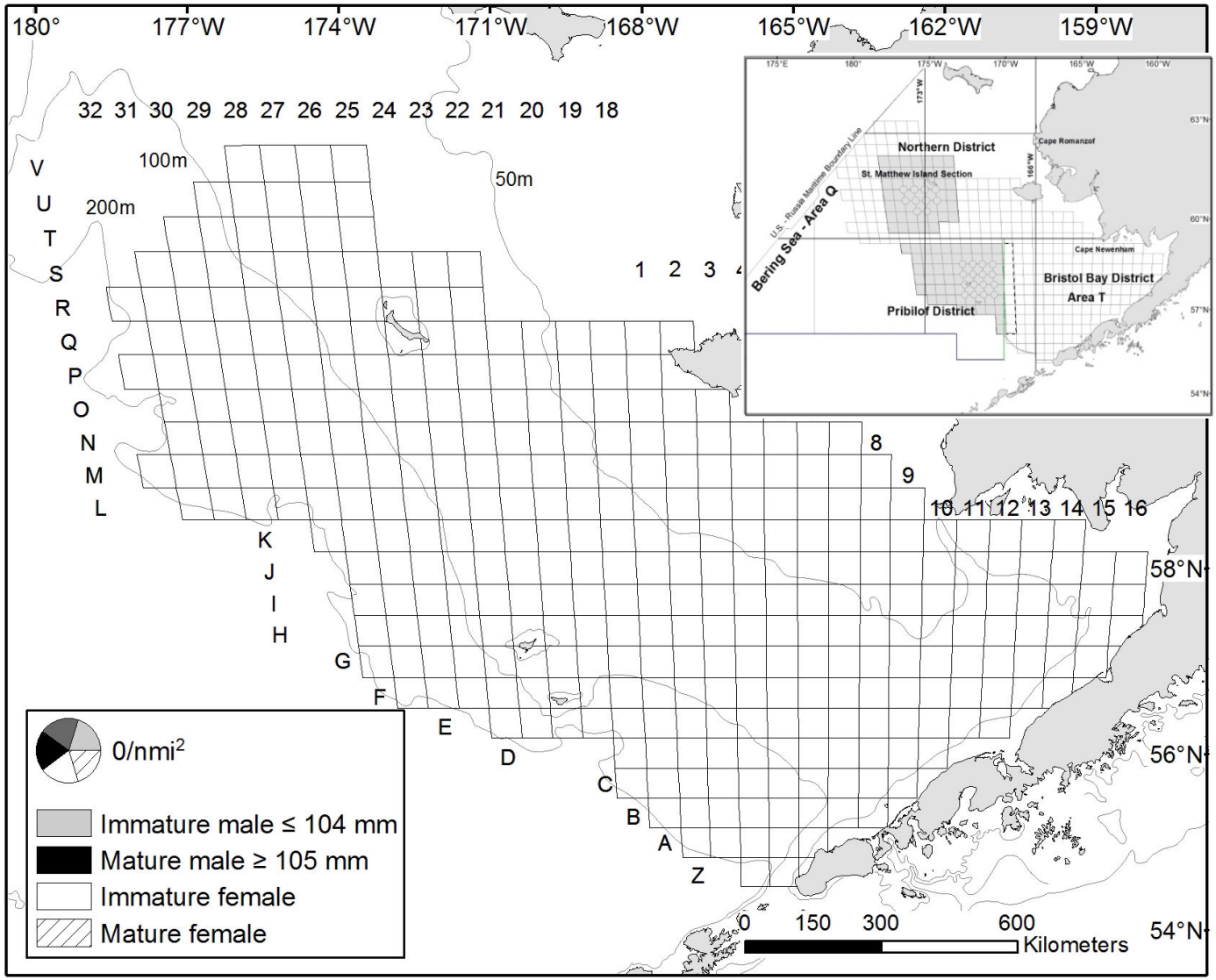


Figure 90. -- Proportion of male and female blue king crab (*Paralithodes platypus*) maturity classes caught at each station sampled in 2019 in the Northern District outside the St. Matthew Island section. The Northern District is an ADF&G commercial crab management unit in the northern section of the eastern Bering Sea, see inset. Note no blue king crab were caught outside the Pribilof District and St. Matthew Island section in 2019.

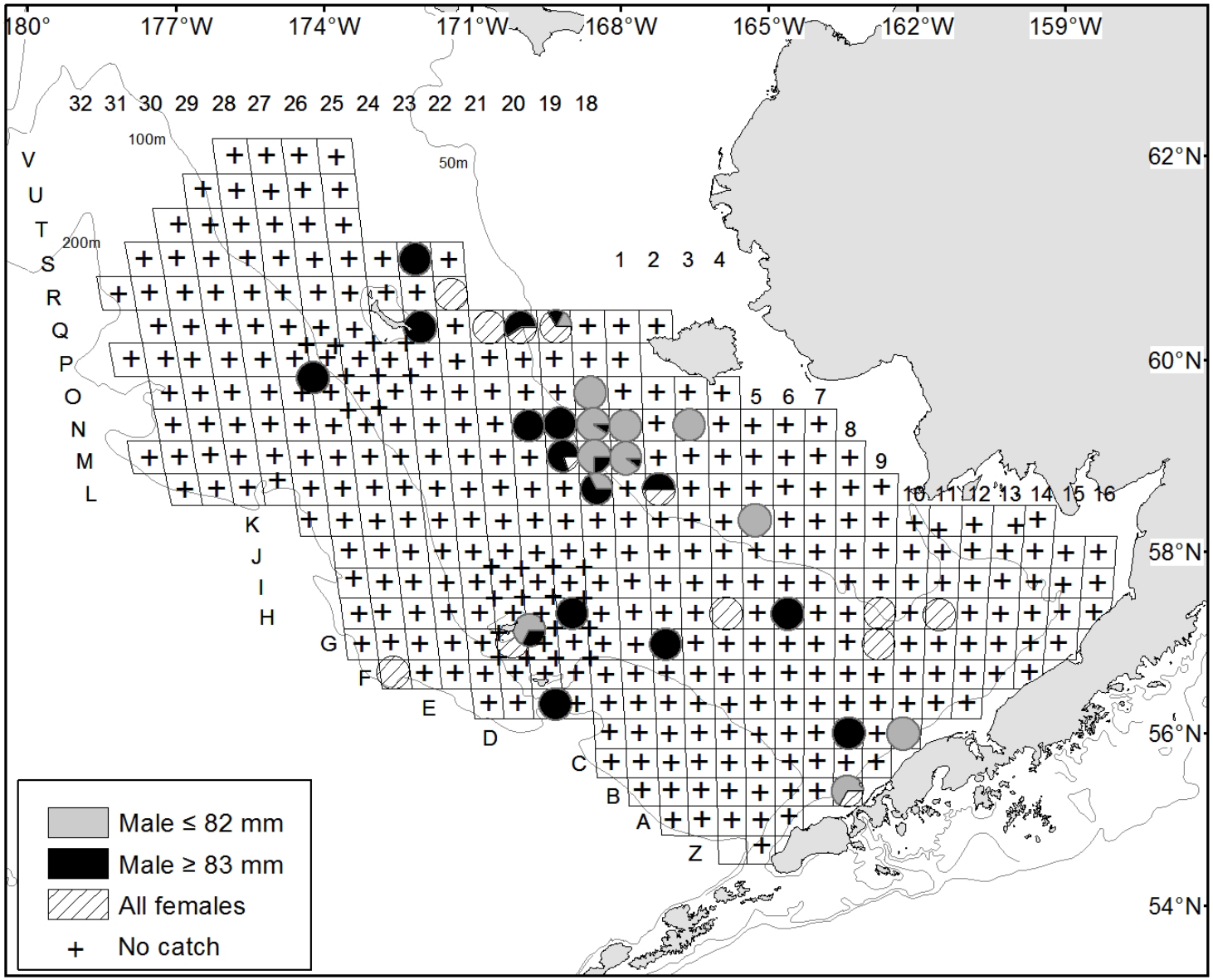


Figure 91. -- Proportion of male and female hair crab (*Erimacrus isenbeckii*) size classes caught at each station sampled in 2019.

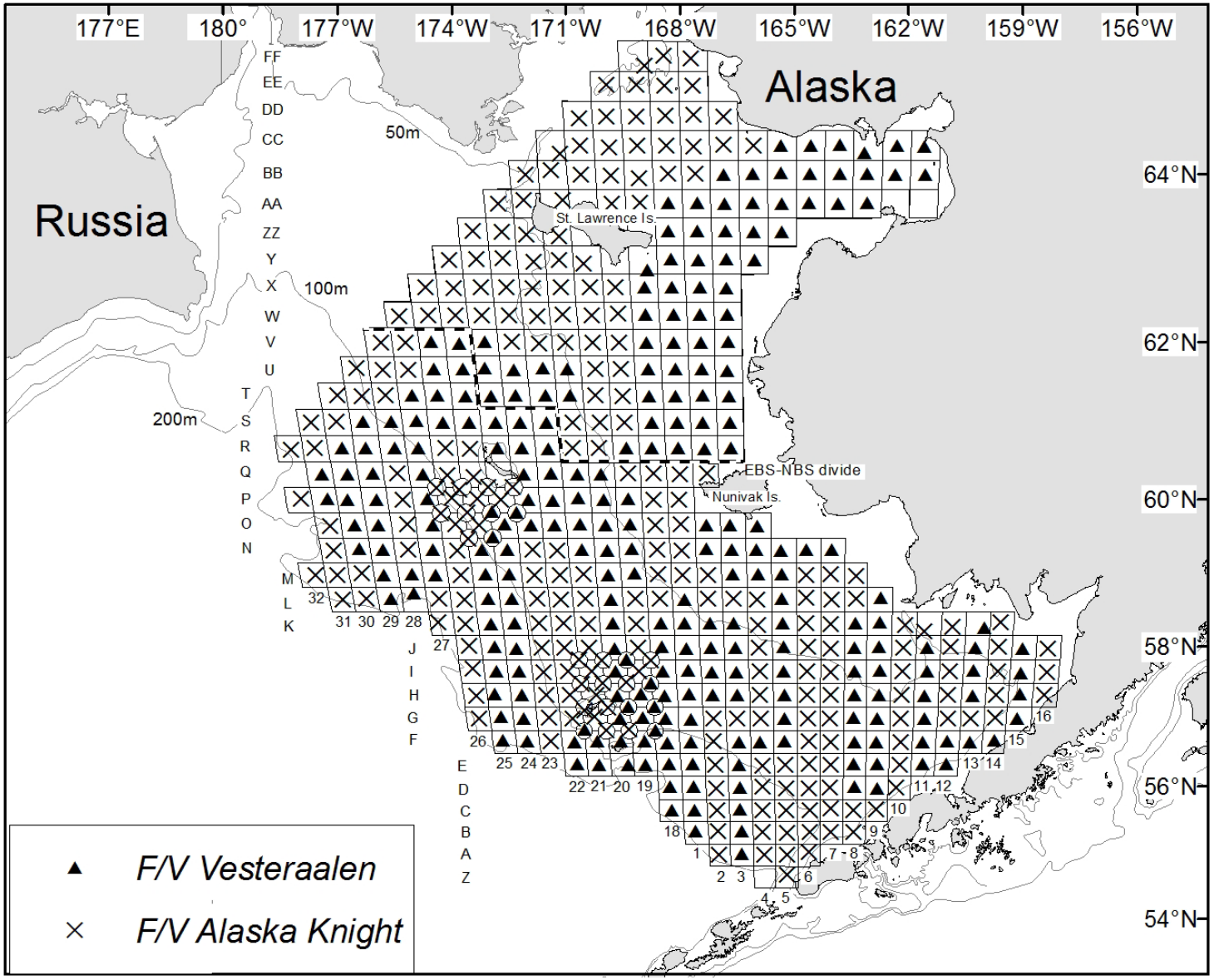


Figure 92. -- National Marine Fisheries Service eastern Bering Sea and northern Bering Sea bottom trawl area surveyed by the FV *Alaska Knight* and the FV *Vesteraalen* from 3 June to 20 August 2019.

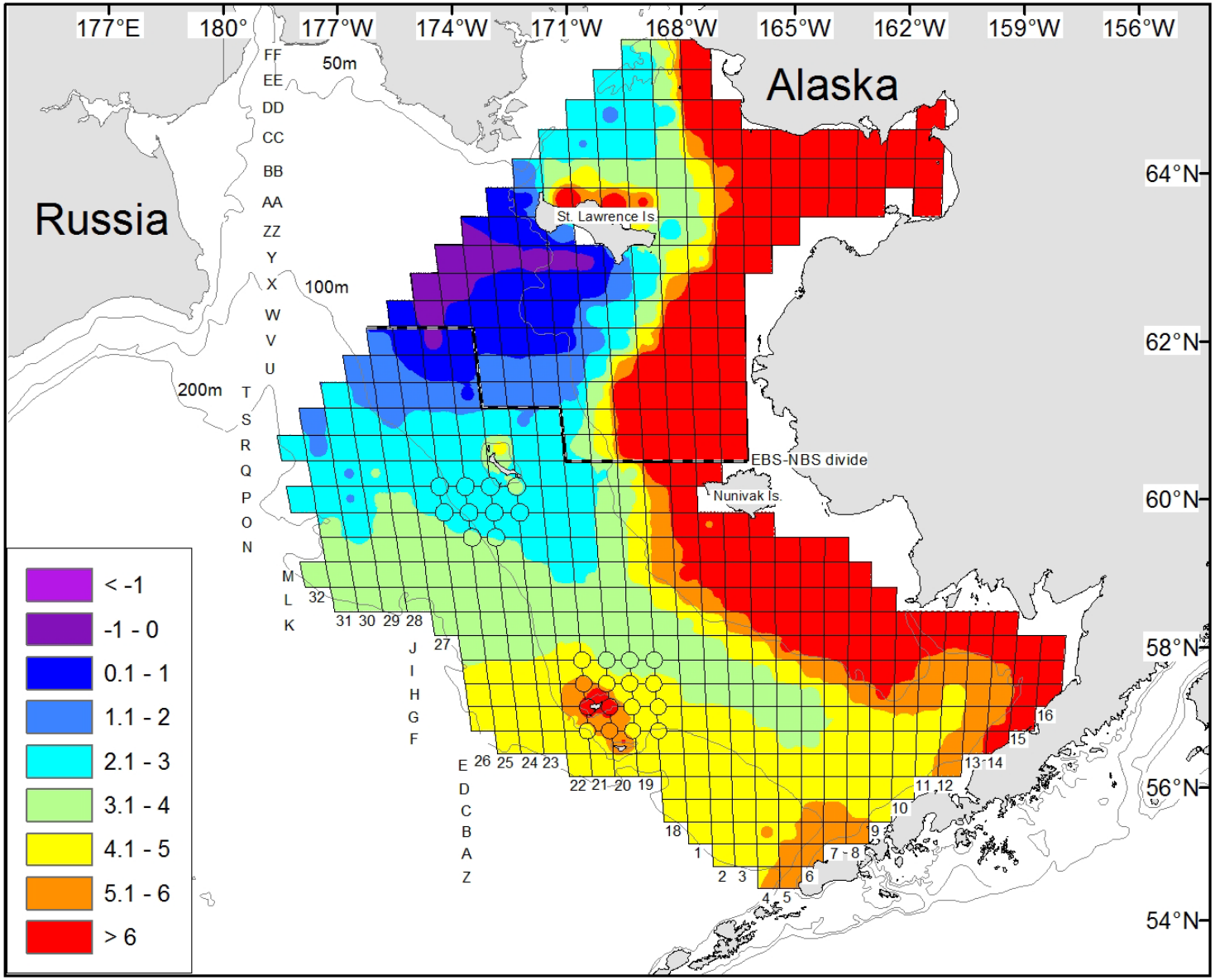


Figure 93. -- Bottom temperatures (°C) measured at stations from the National Marine Fisheries Service eastern Bering Sea and northern Bering Sea bottom trawl surveys, beginning 3 June to 20 August 2019.

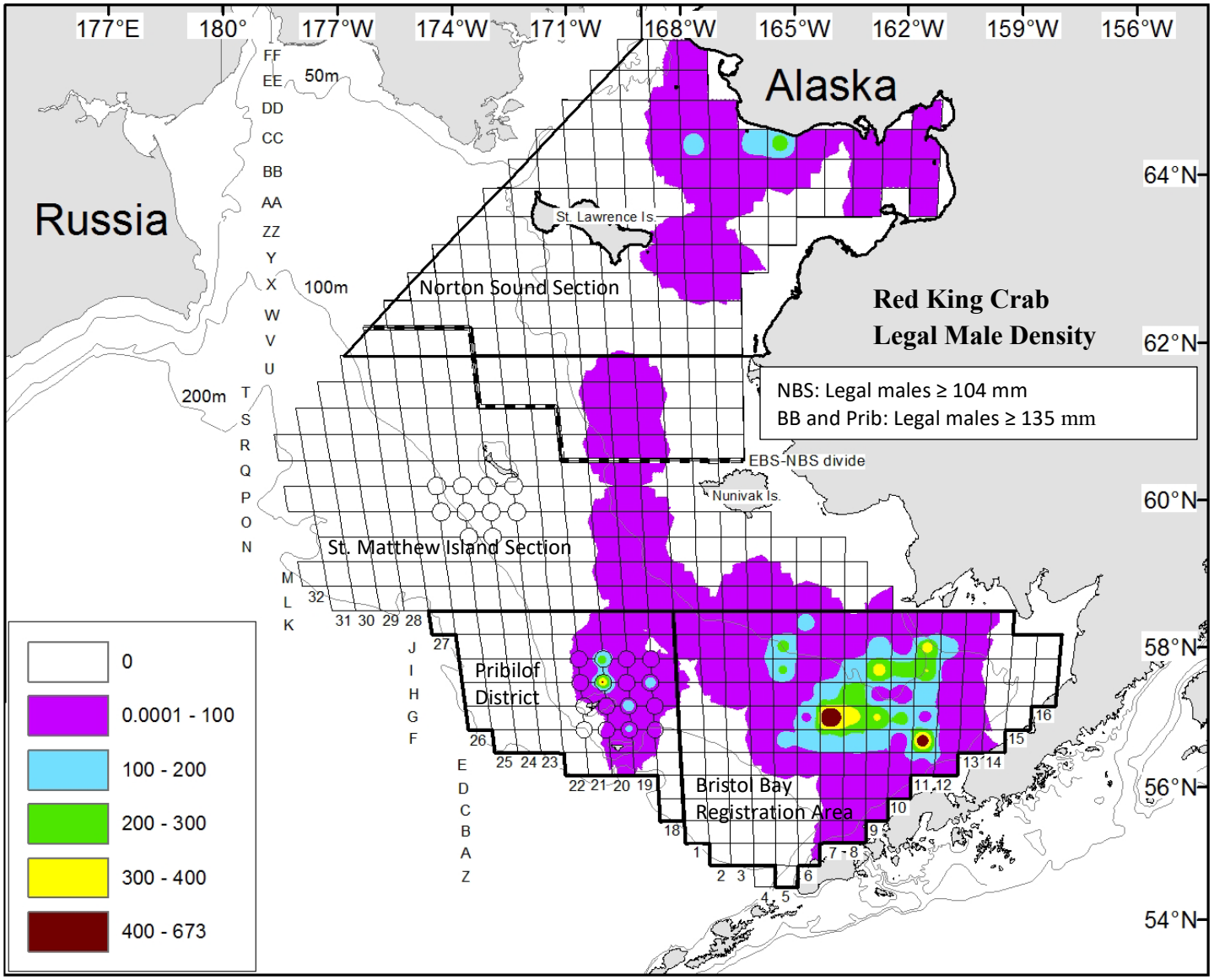


Figure 94. -- Estimated total density (number nmi^{-2}) of legal male red king crab (*Paralithodes camtschaticus*) at each station sampled in the eastern and northern Bering Sea in 2019.

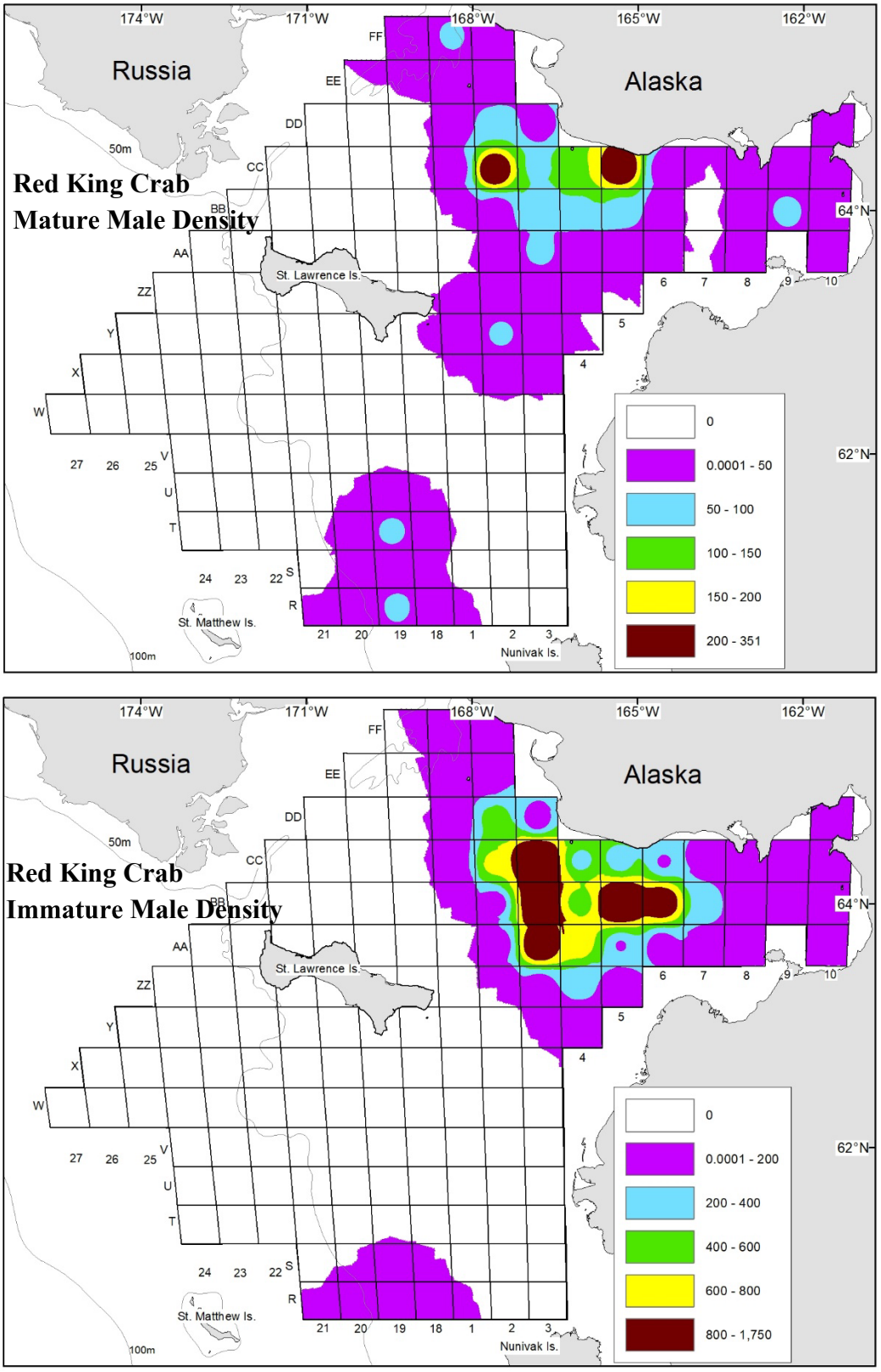


Figure 95a. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the northern Bering Sea in 2019.

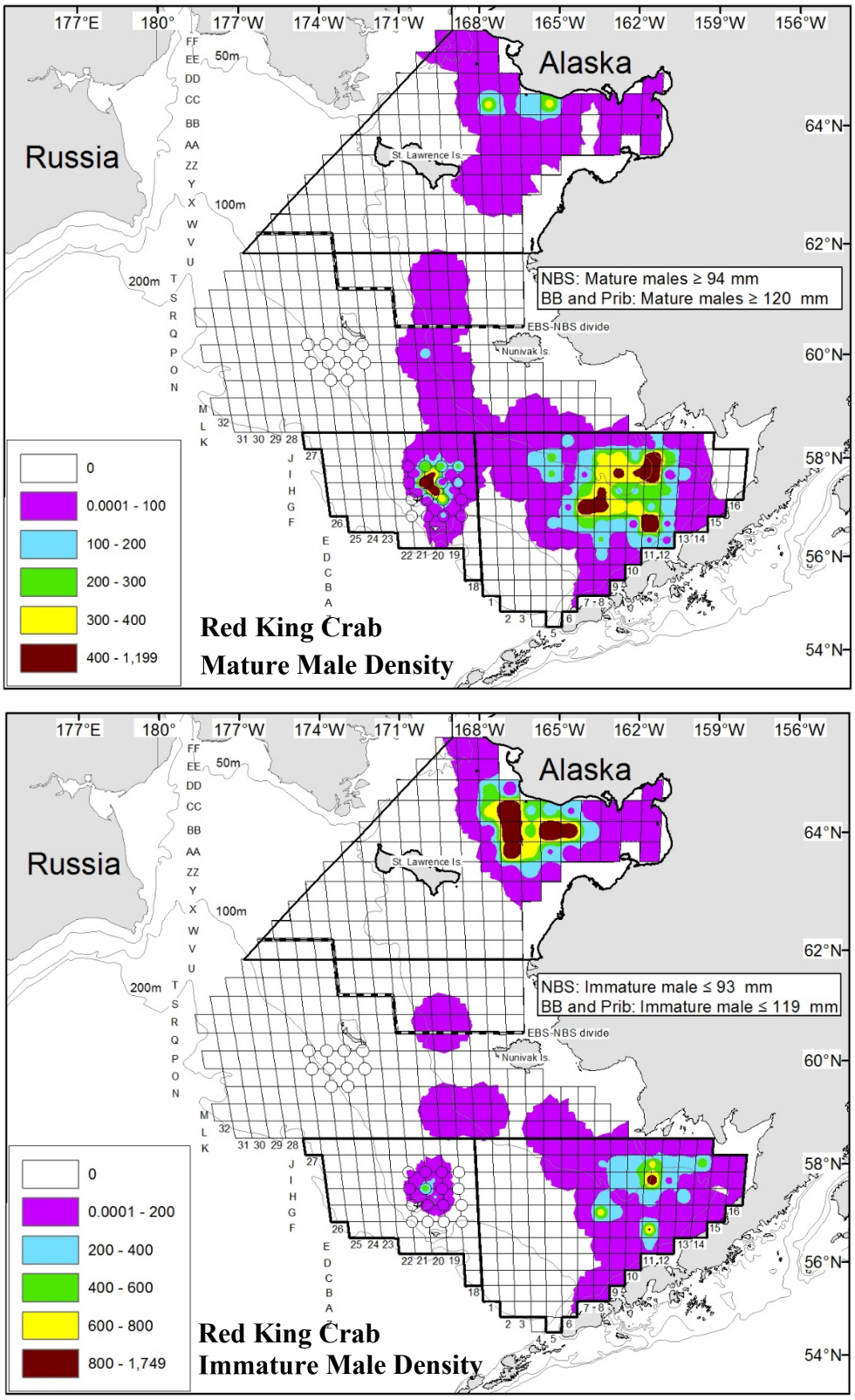


Figure 95b. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

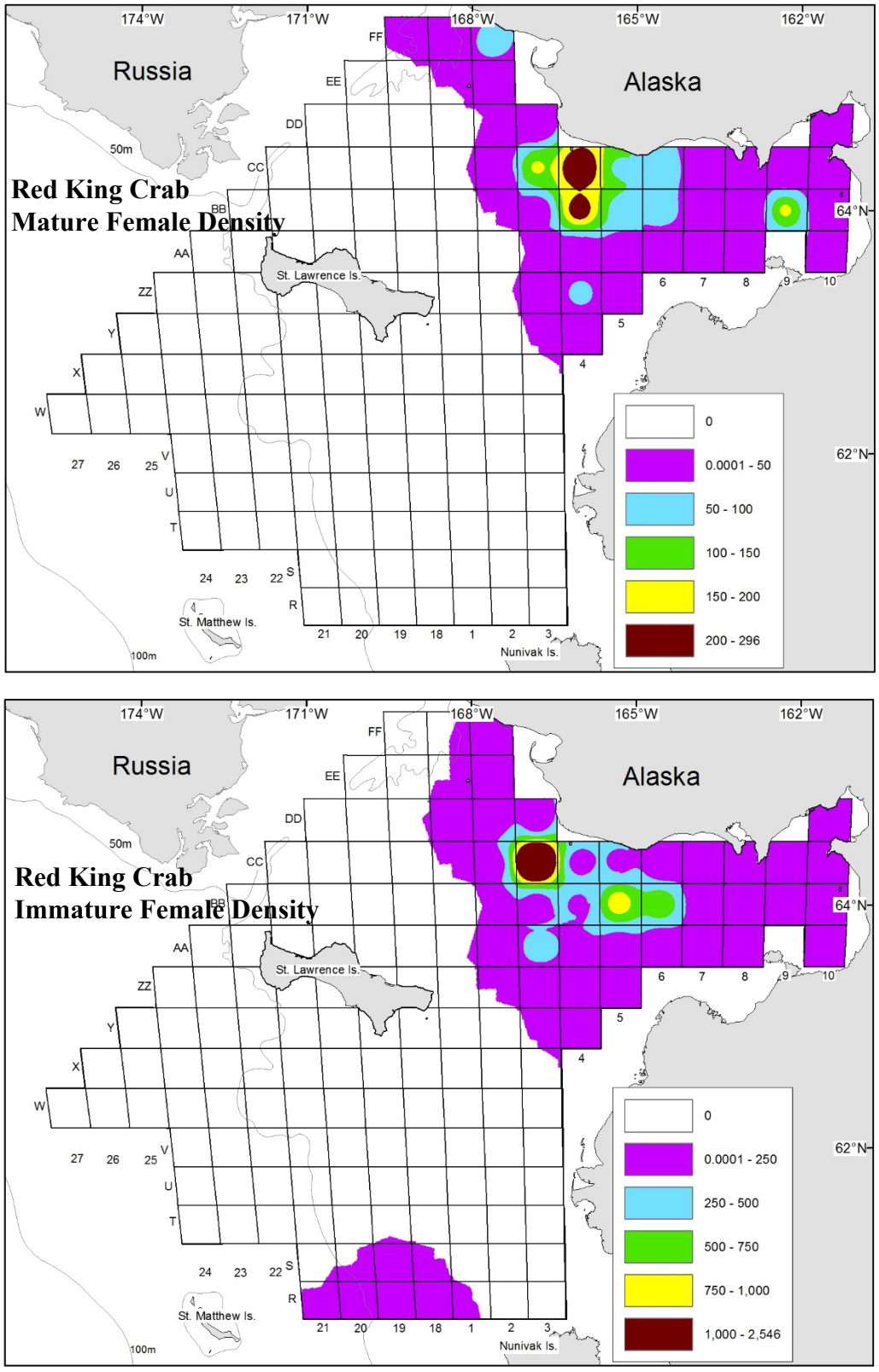
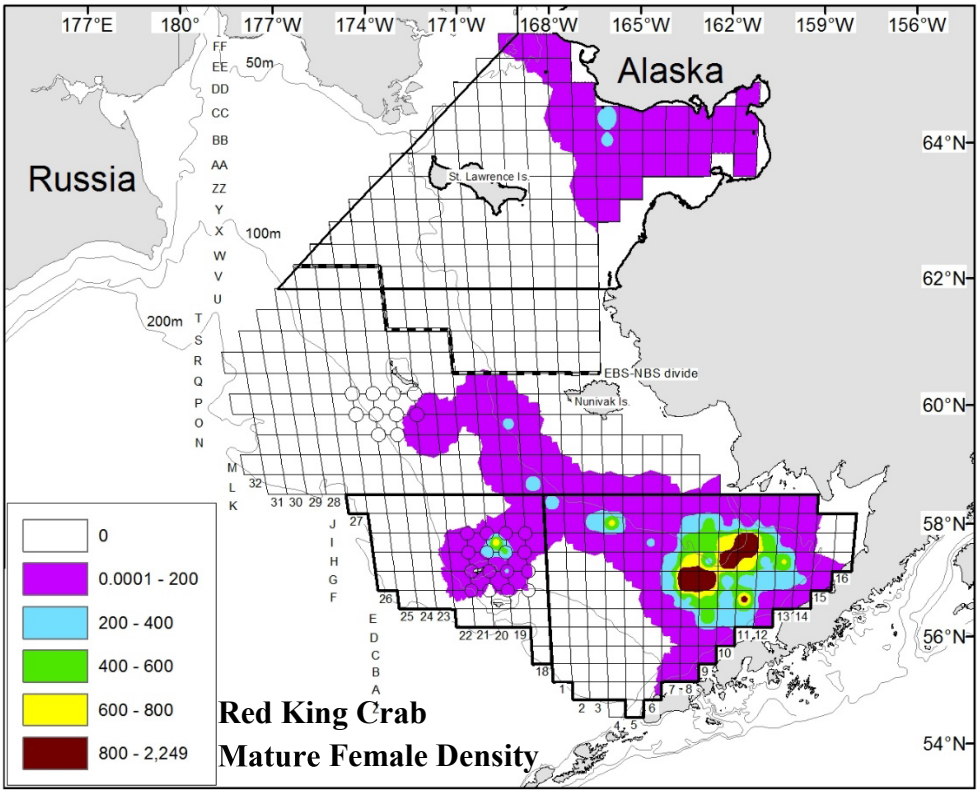


Figure 96a. -- Total density (number nmi^{-2}) of mature female (top) and immature female (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the northern Bering Sea in 2019.



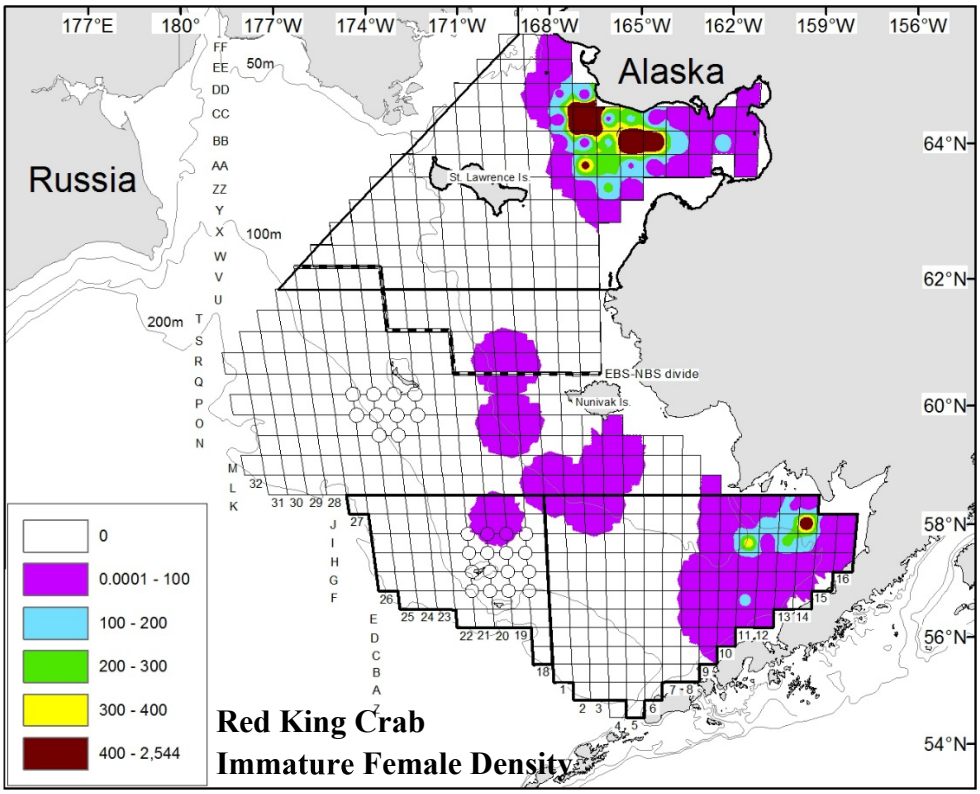


Figure 96b. --Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) red king crab (*Paralithodes camtschaticus*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

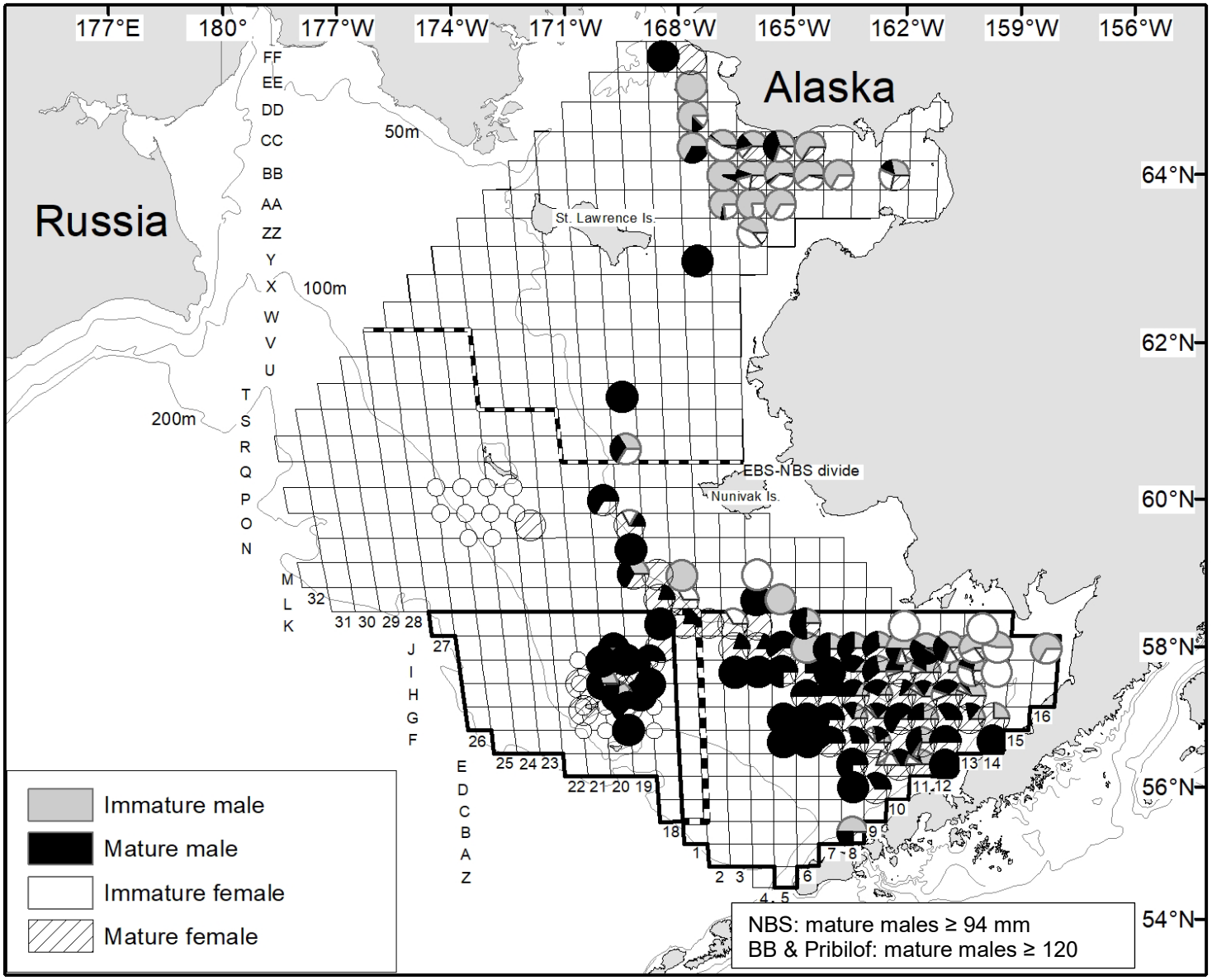


Figure 97. -- Proportion of male and female red king crab (*Paralithodes camtschaticus*) maturity classes caught at each station sampled in 2019 in the eastern Bering Sea and northern Bering Sea.

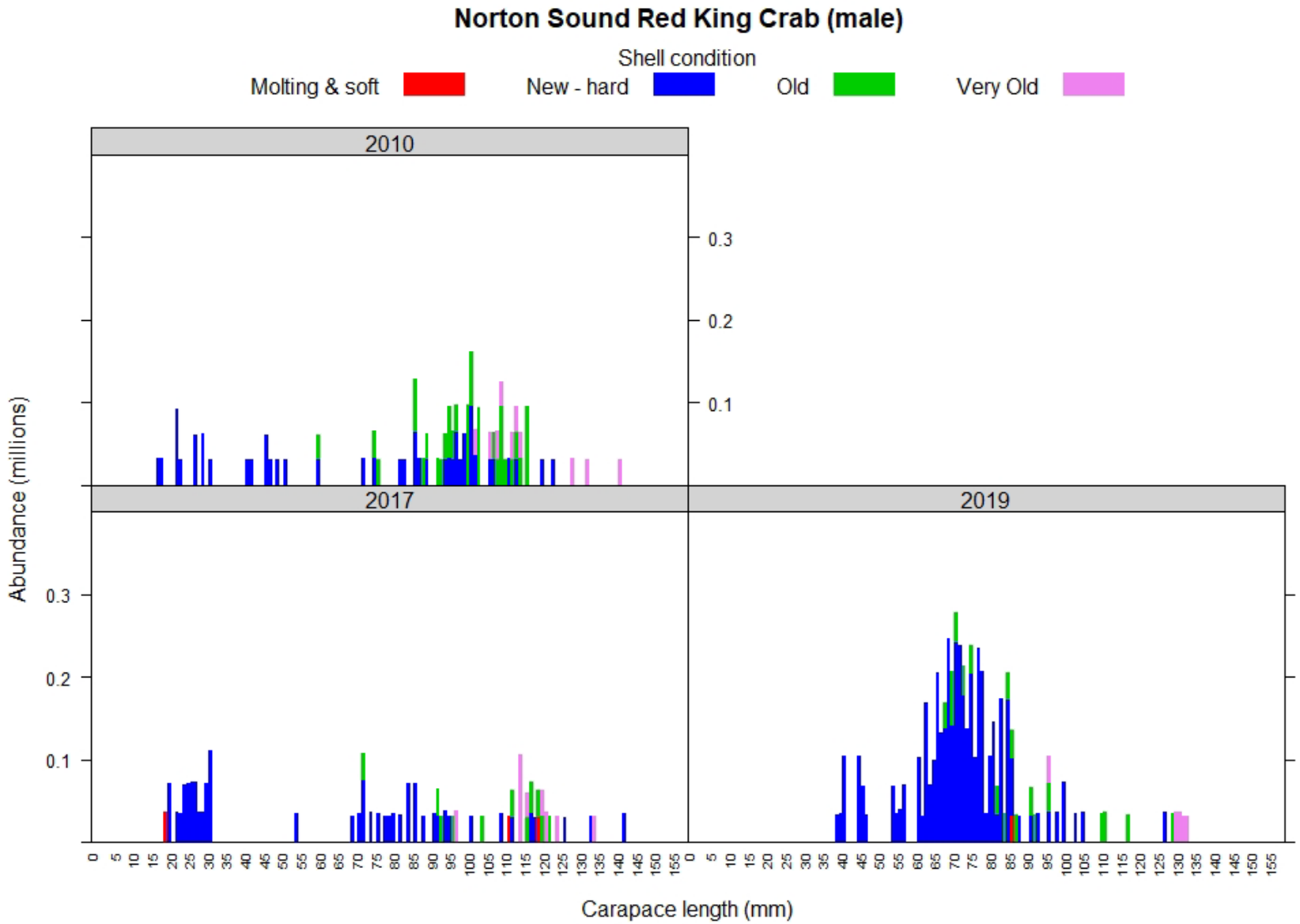


Figure 98. -- Abundance (millions) by size and shell condition of male Norton Sound red king crab (*Paralithodes camtschaticus*) using 1 mm width classes in 2019.

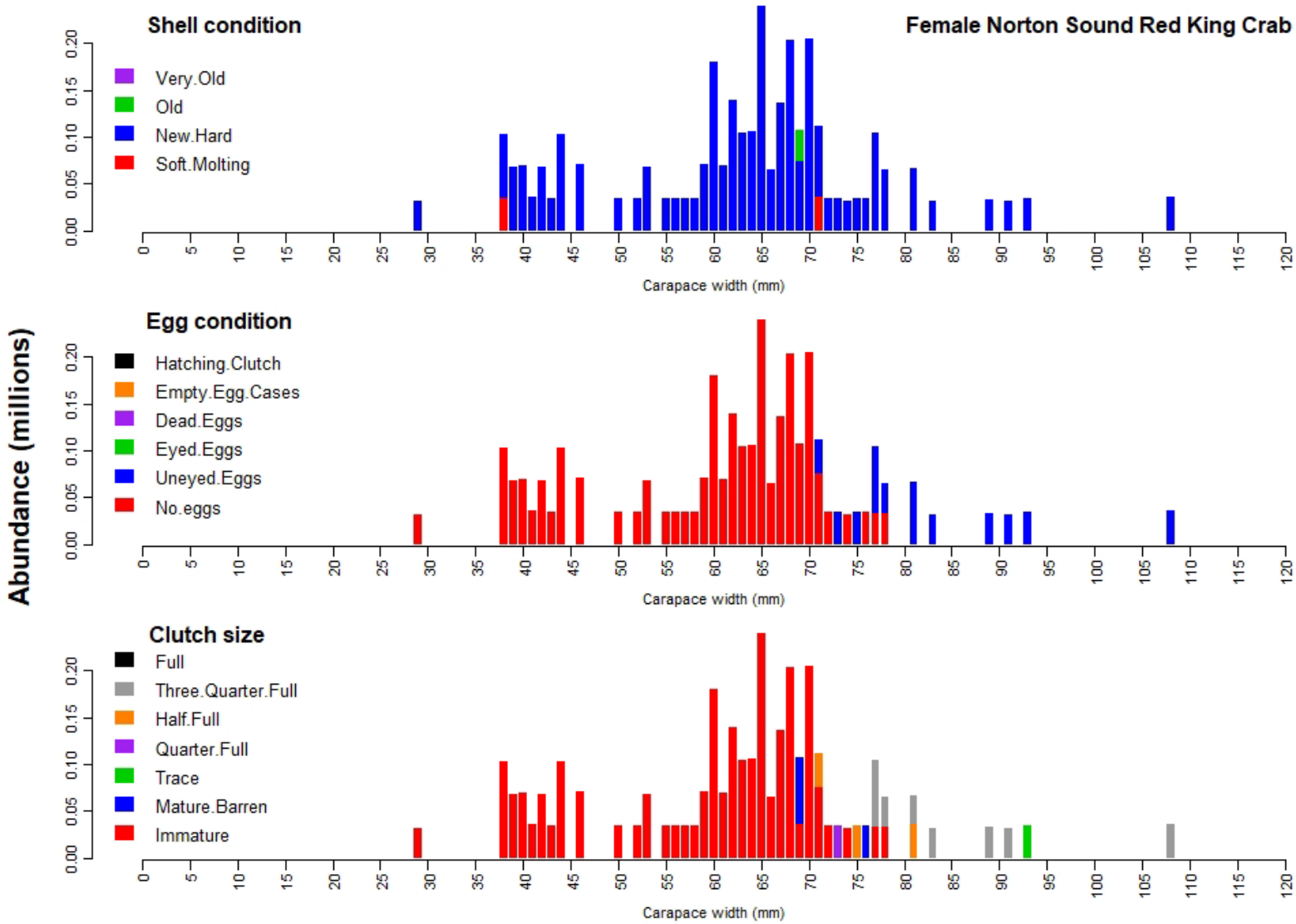


Figure 99. -- Size frequency by shell condition, egg condition, and clutch fullness of female Norton Sound red king crab (*Paralithodes camtschaticus*) by 1 mm width classes in 2019.

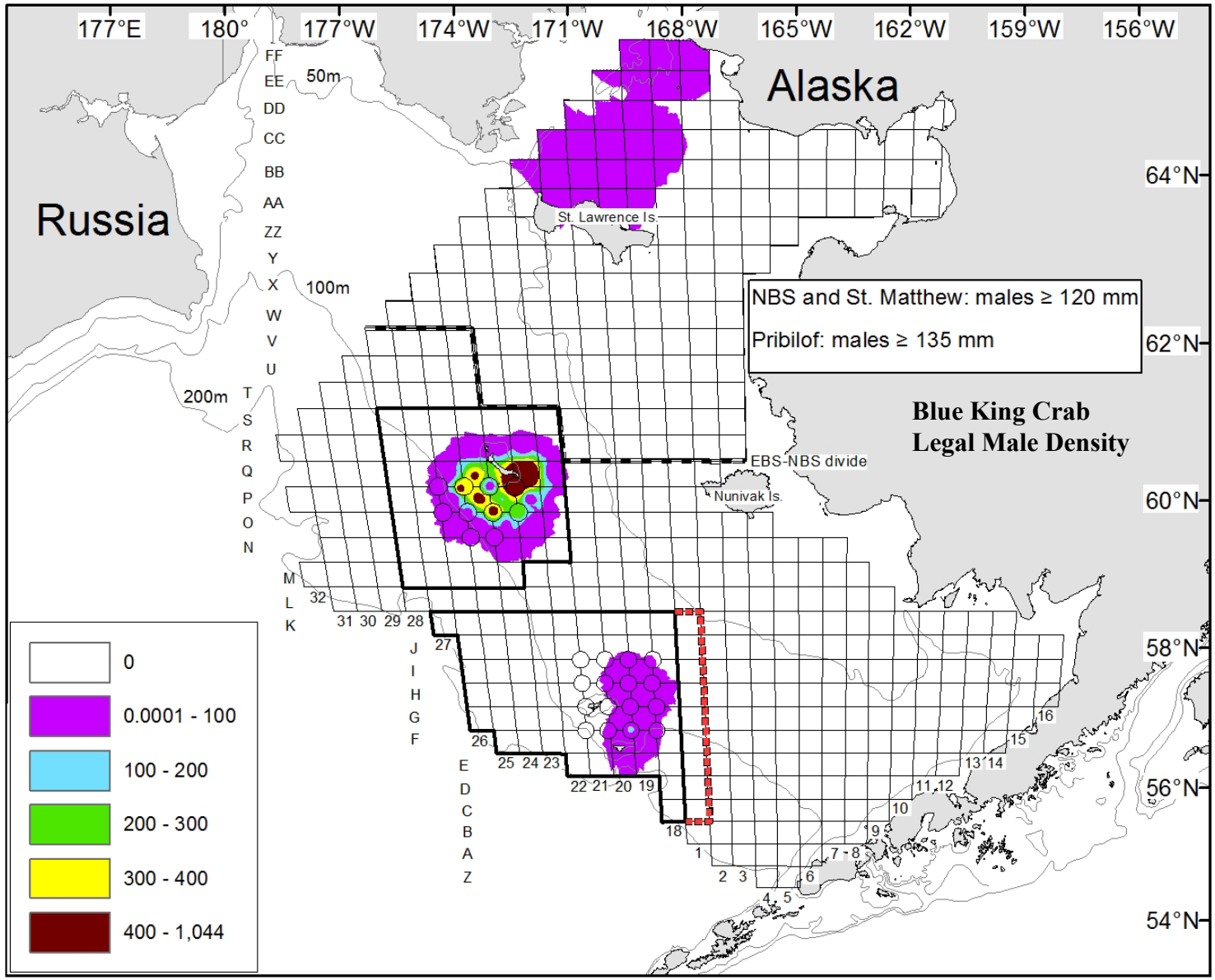
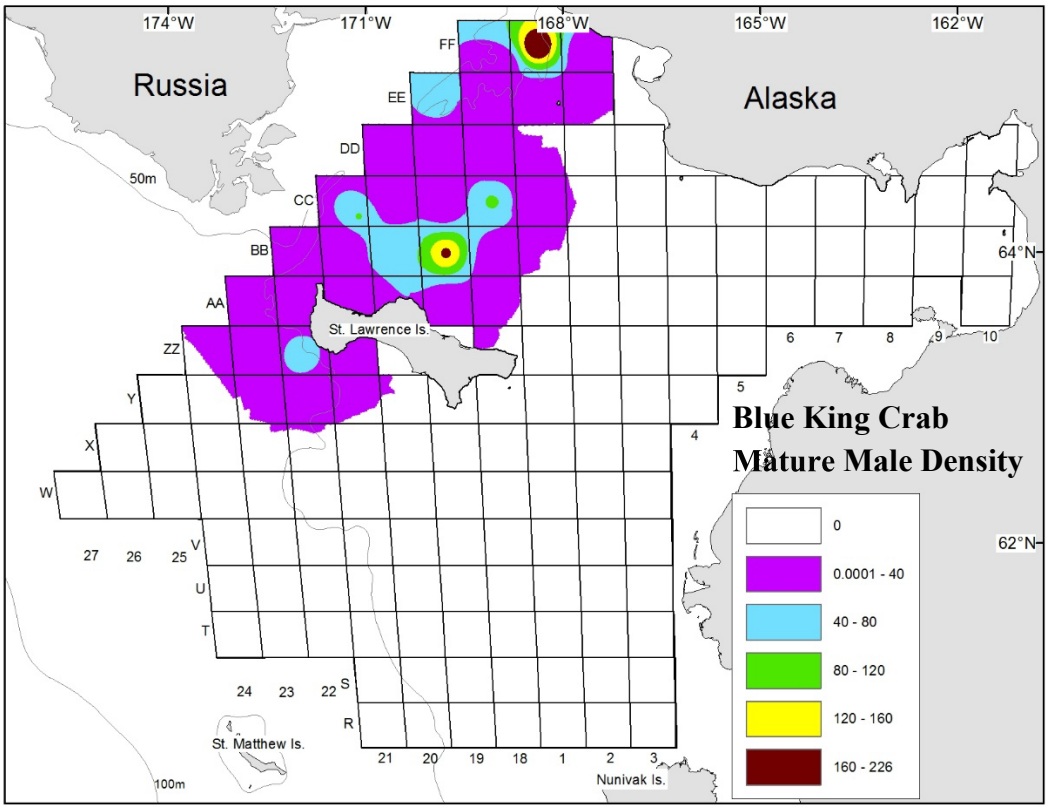


Figure 100. --Estimated total density (number nmi^{-2}) of legal male blue king crab (*Paralithodes platypus*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.



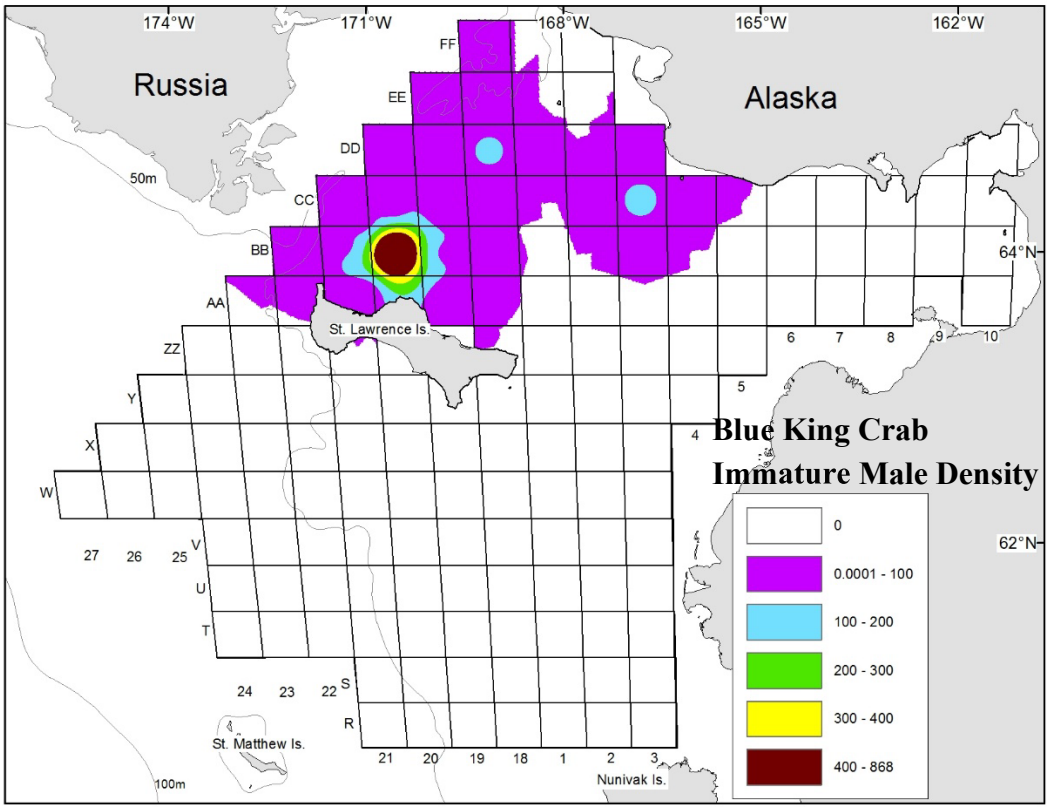
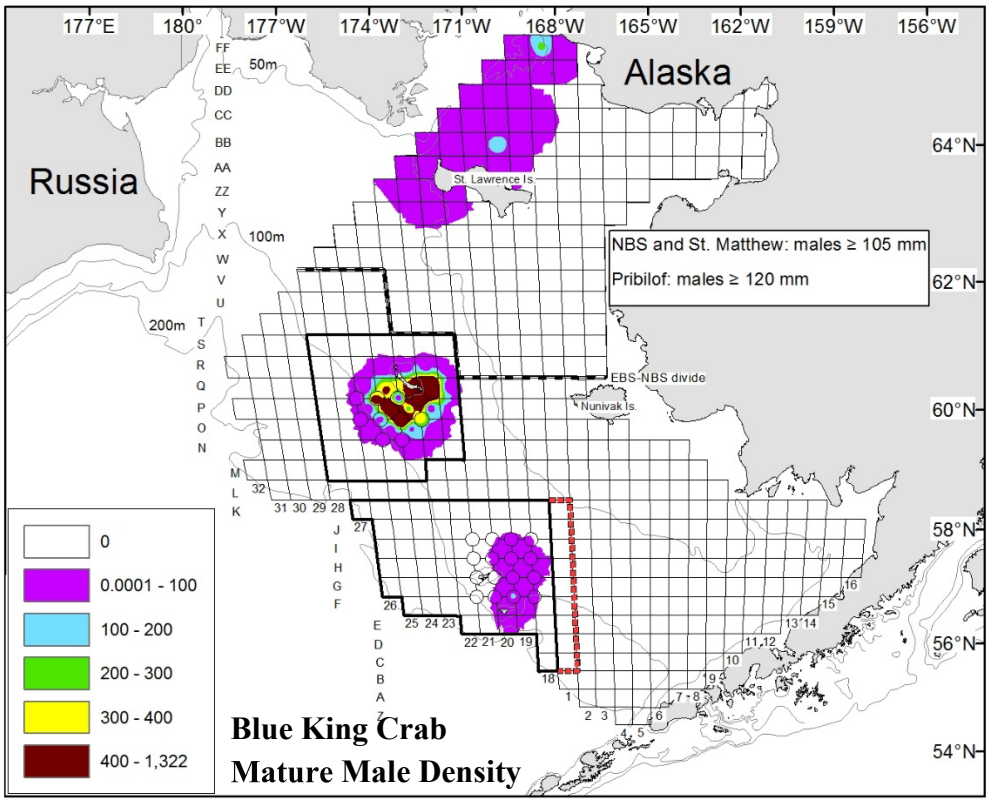


Figure 101a. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in northern Bering Sea in 2019.



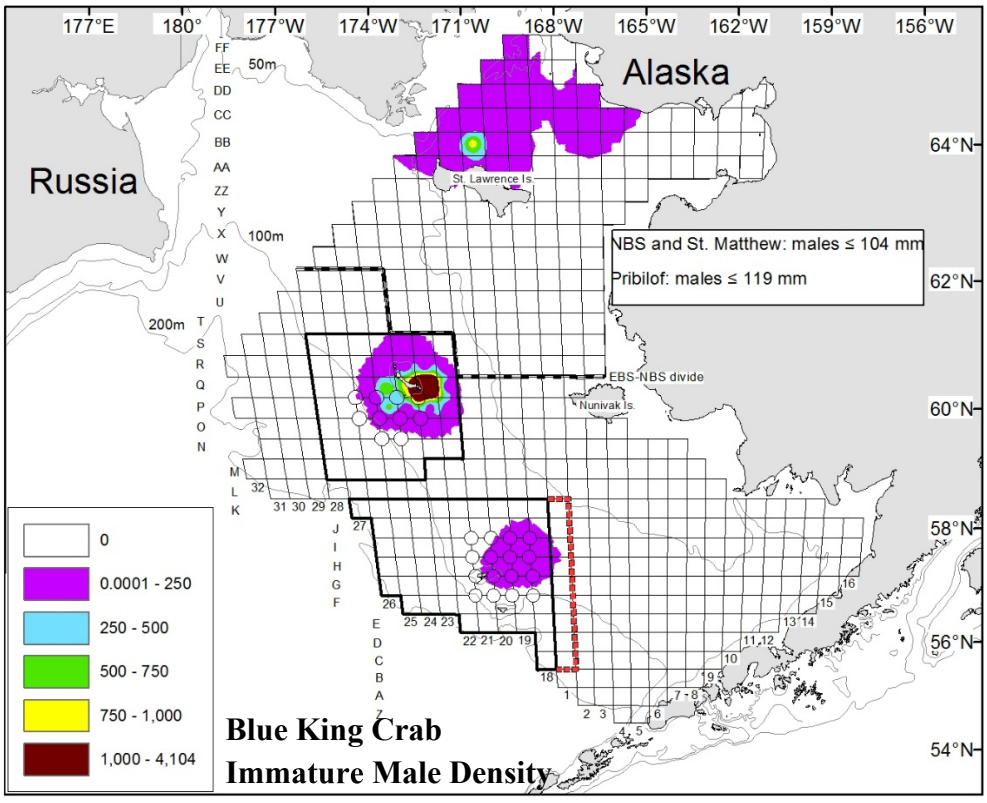


Figure 101b. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

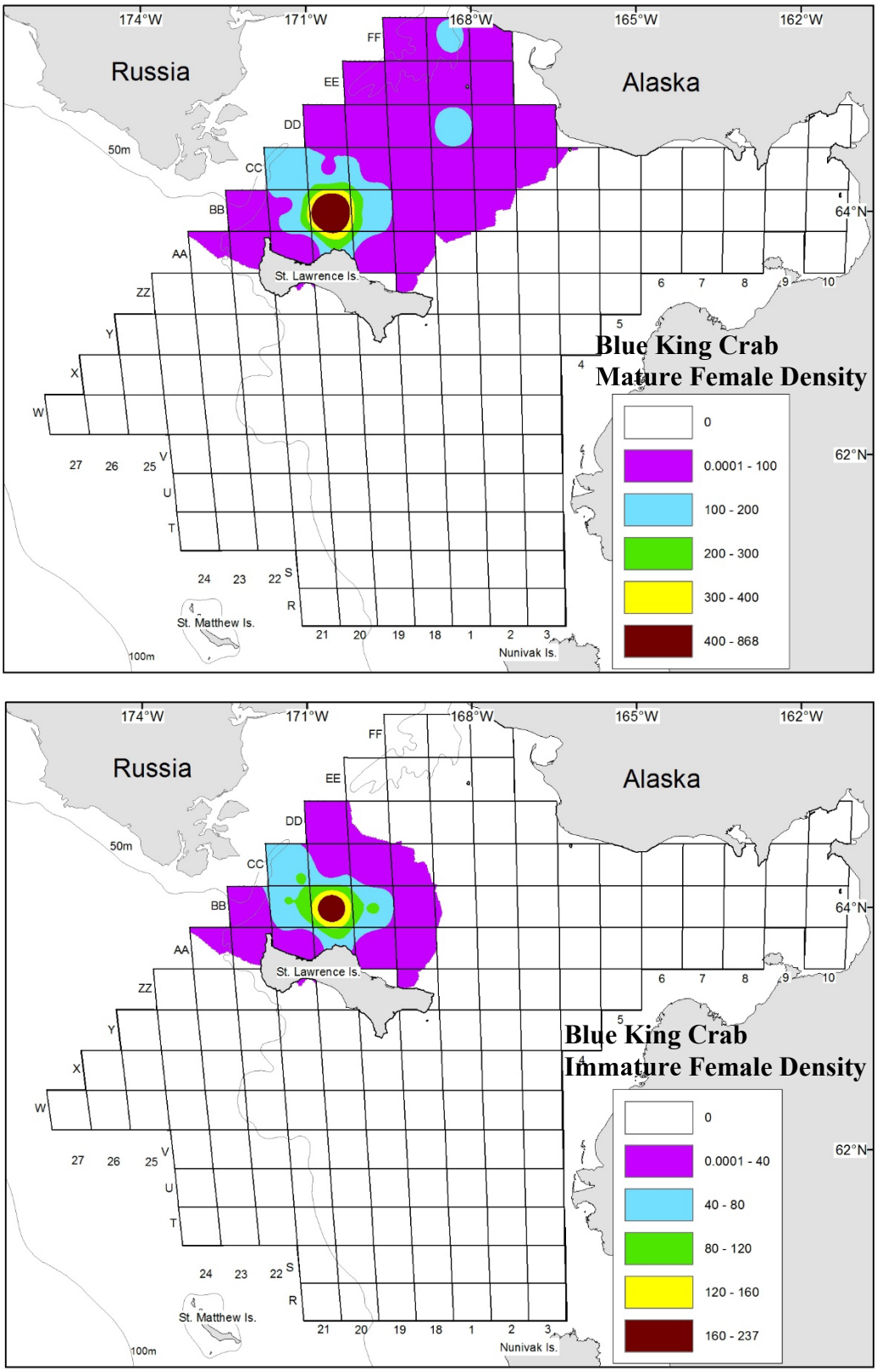
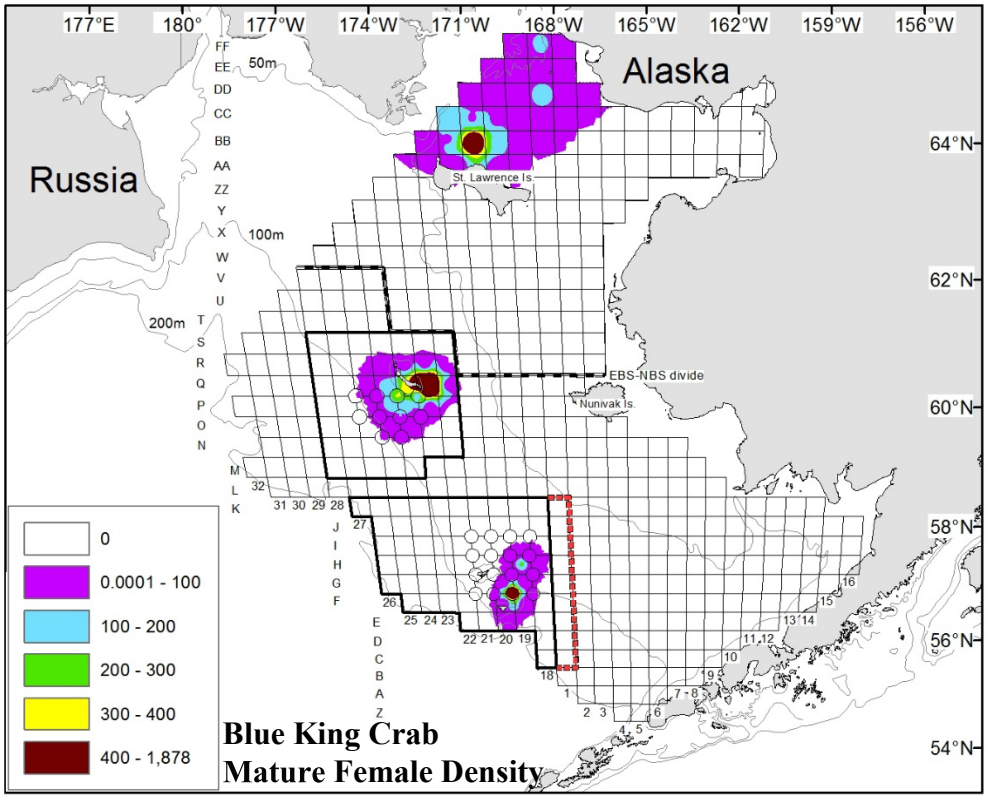


Figure 102a. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the northern Bering Sea in 2019.



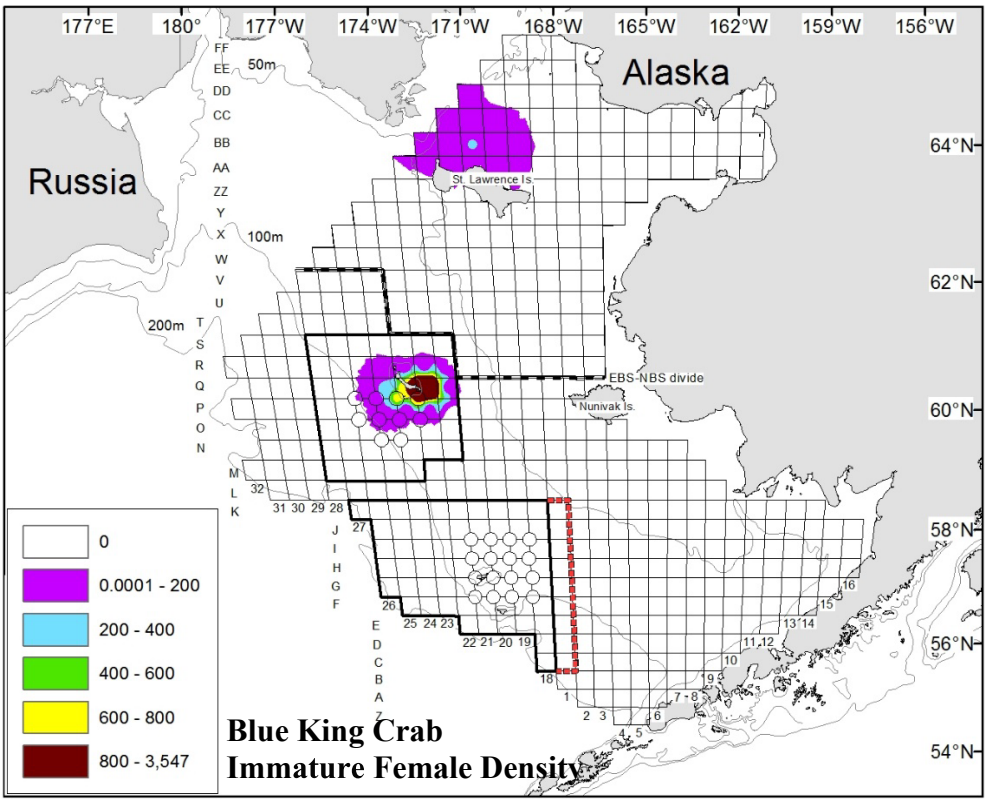


Figure 102b. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) blue king crab (*Paralithodes platypus*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

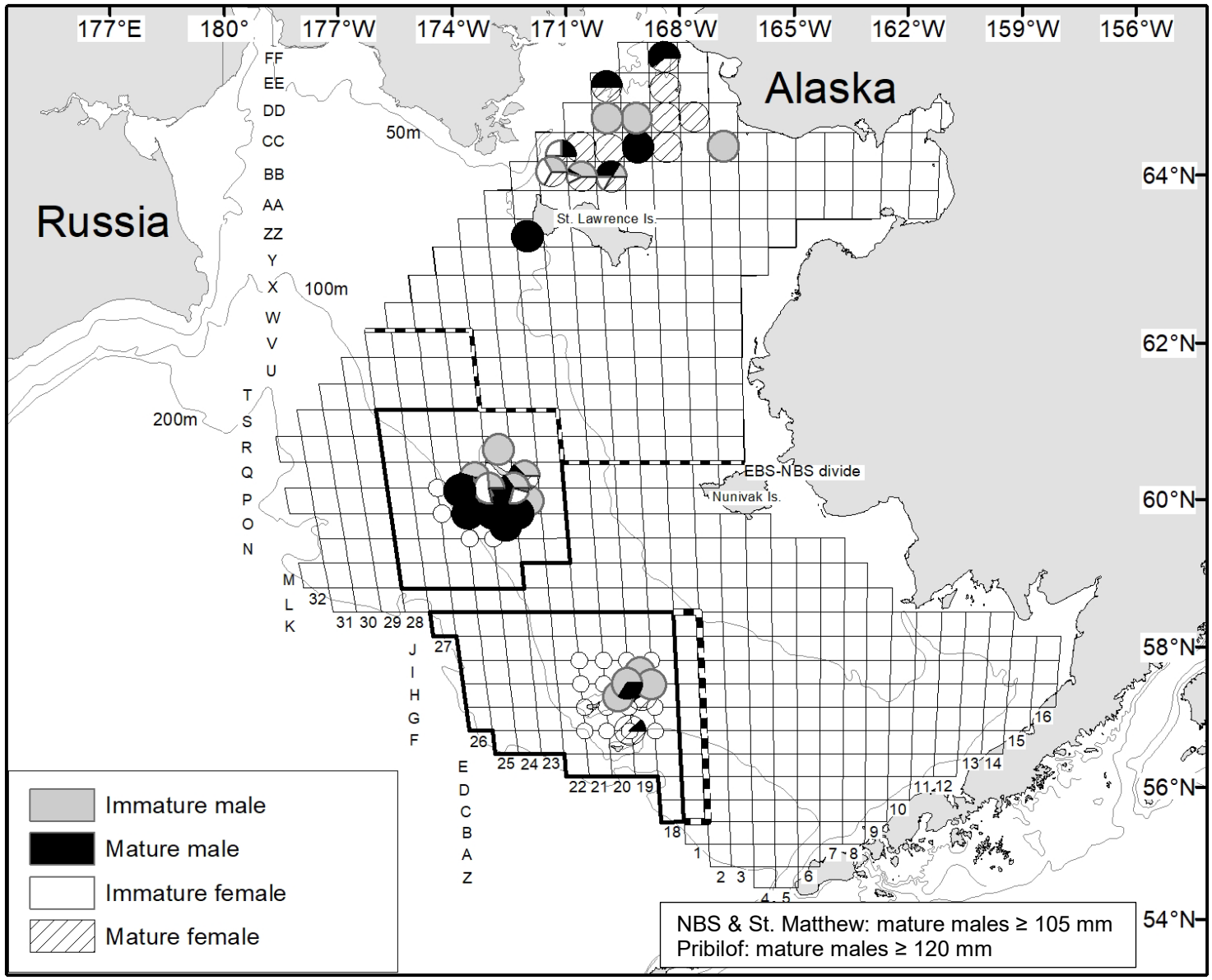


Figure 103. -- Proportion of male and female blue king crab (*Paralithodes platypus*) maturity classes caught at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

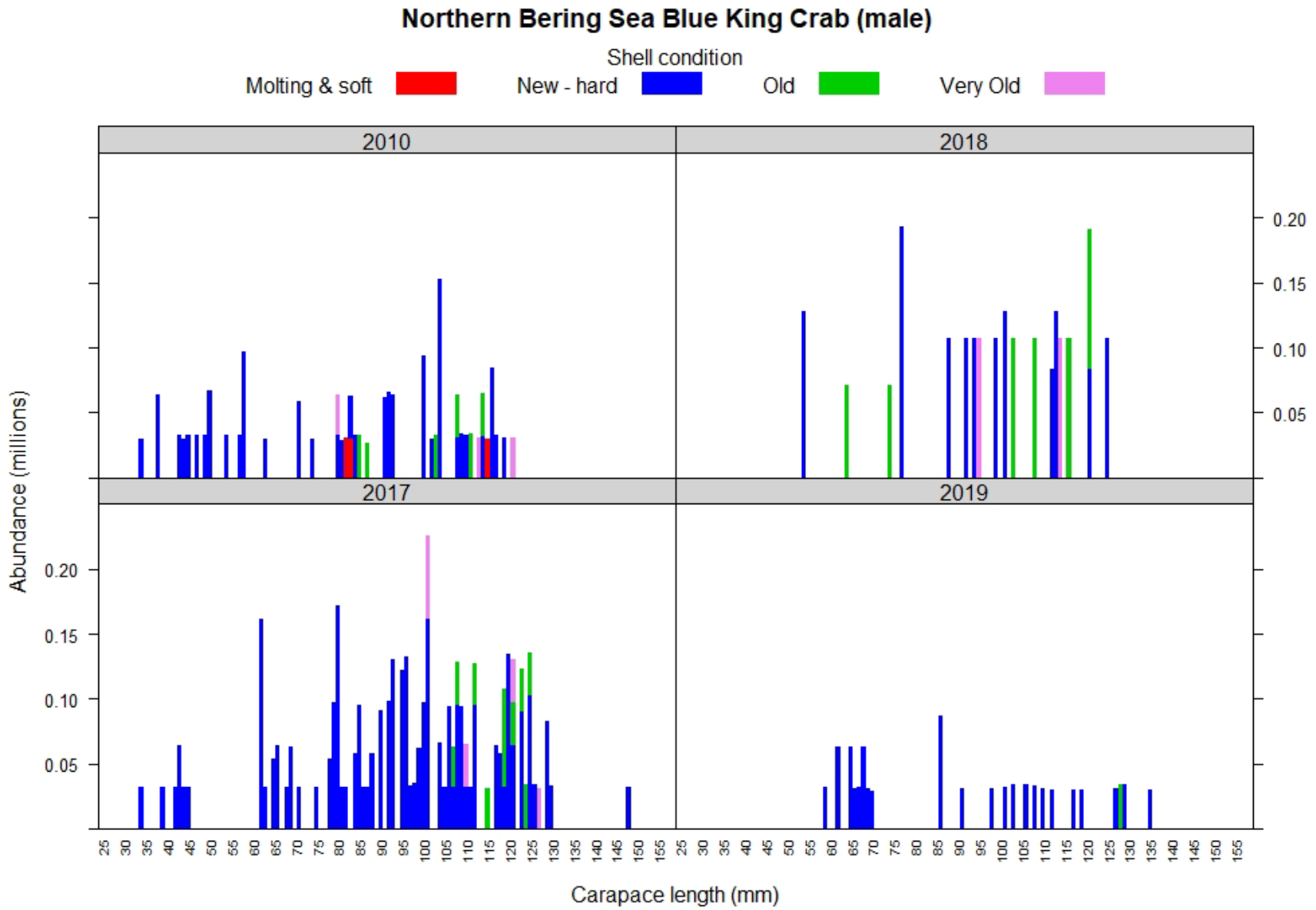


Figure 104. -- Abundance (millions) by size and shell condition of male blue king crab (*Paralithodes platypus*) using 1 mm width classes for the northern Bering Sea in 2019.

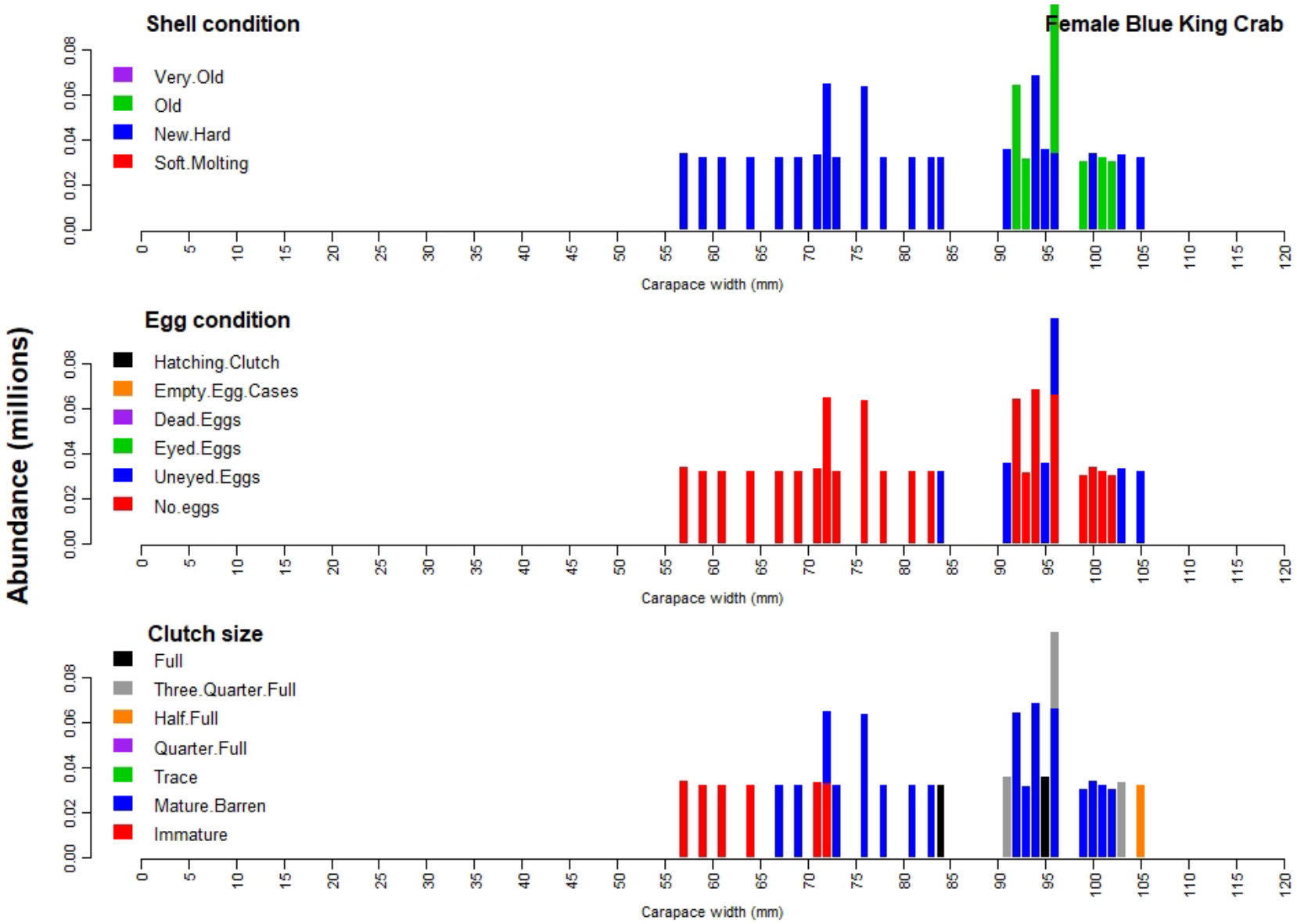


Figure 105. -- Size frequency by shell condition, egg condition, and clutch fullness of female blue king crab (*Paralithodes platypus*) by 1 mm width classes in the northern Bering Sea in 2019.

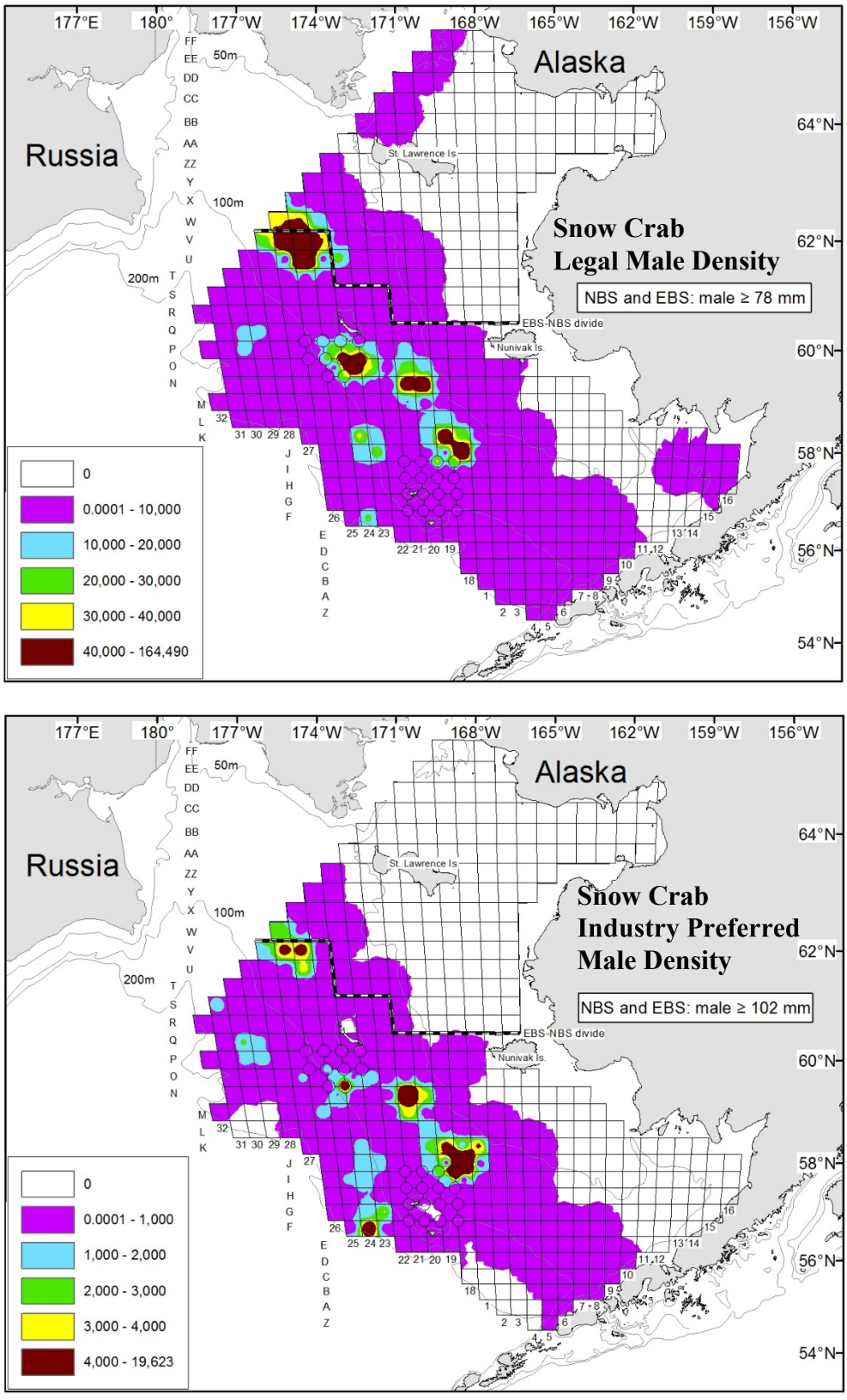


Figure 106. --Estimated total density (number nmi^{-2}) of legal size male snow crab (*Chionoecetes opilio*) (top) and industry preferred size male snow crab (bottom) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

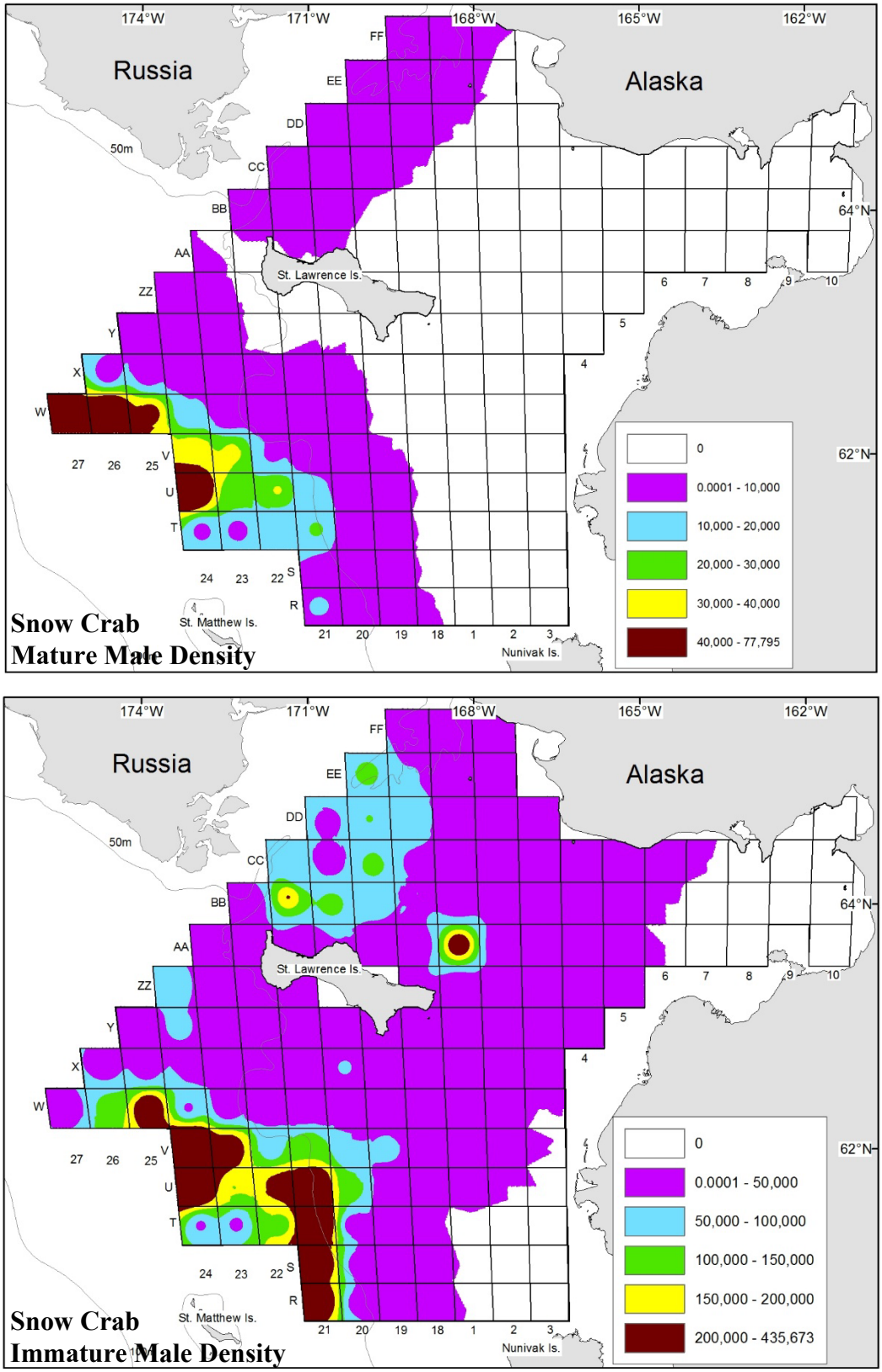


Figure 107a. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) snow crab (*Chionoecetes opilio*) at each station sampled in northern Bering Sea in 2019.

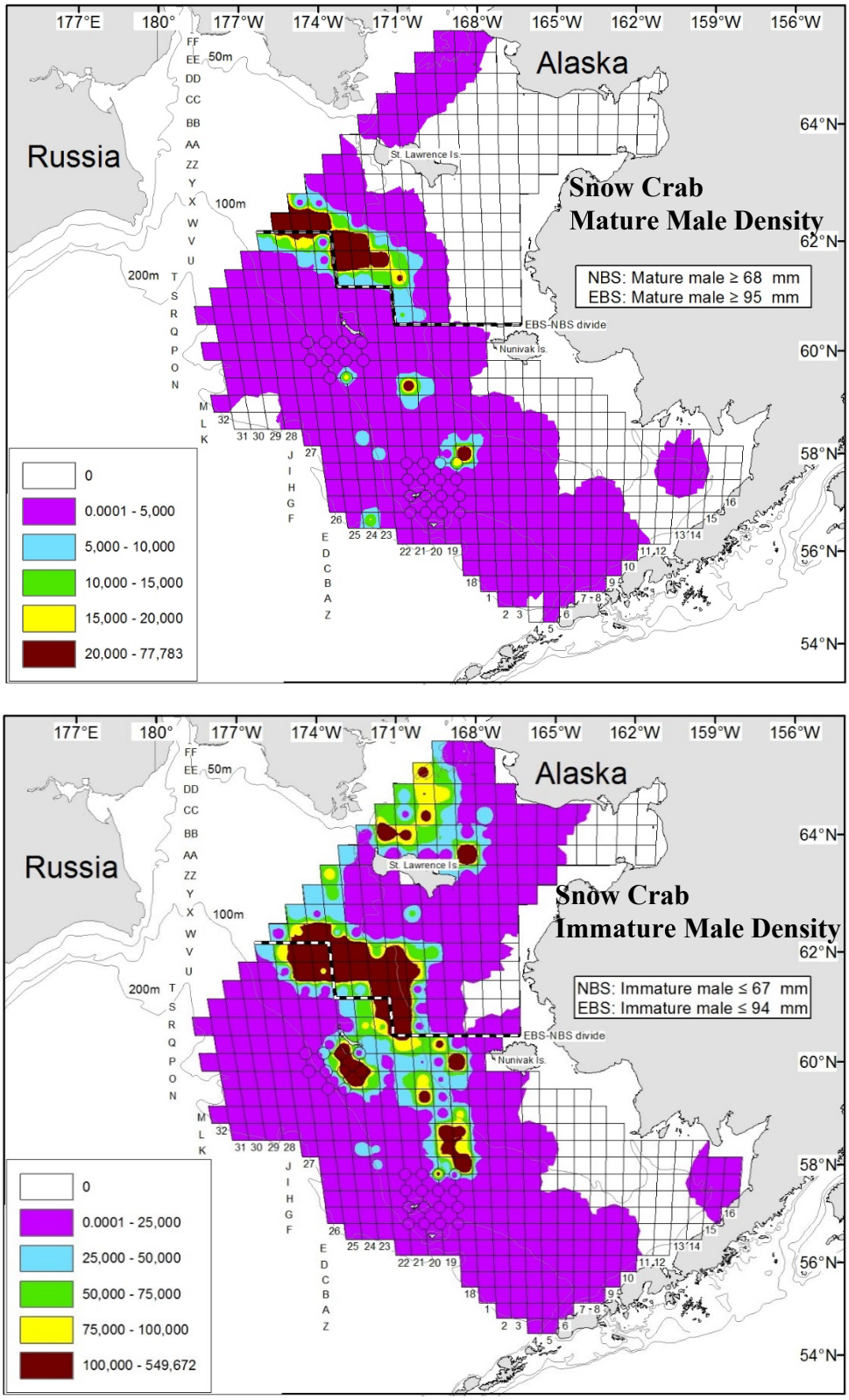


Figure 107b. -- Estimated total density (number nmi^{-2}) of mature male (top) and immature male (bottom) snow crab (*Chionoecetes opilio*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

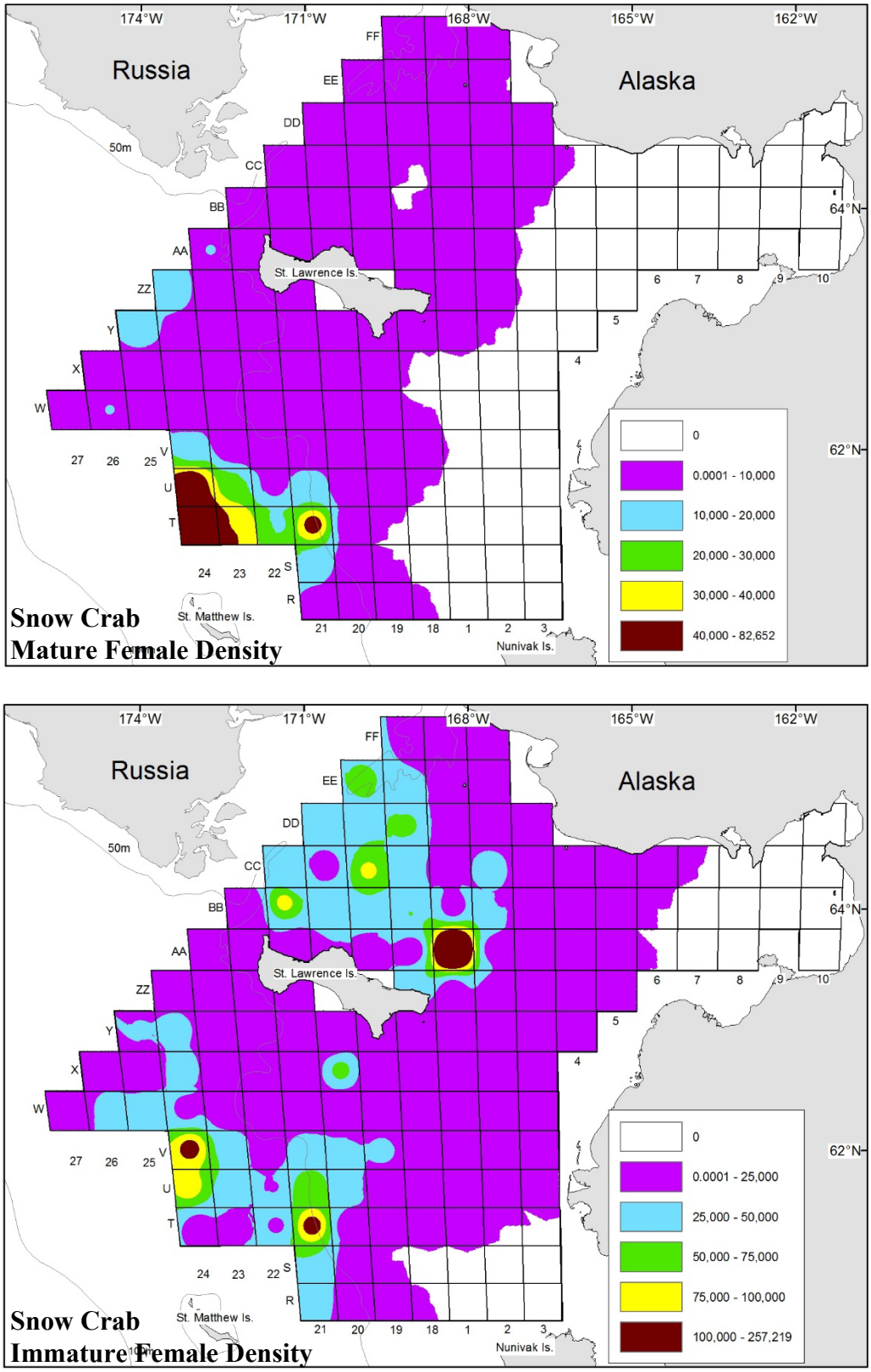


Figure 108a. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) snow crab (*Chionoecetes opilio*) at each station sampled in northern Bering Sea in 2019.

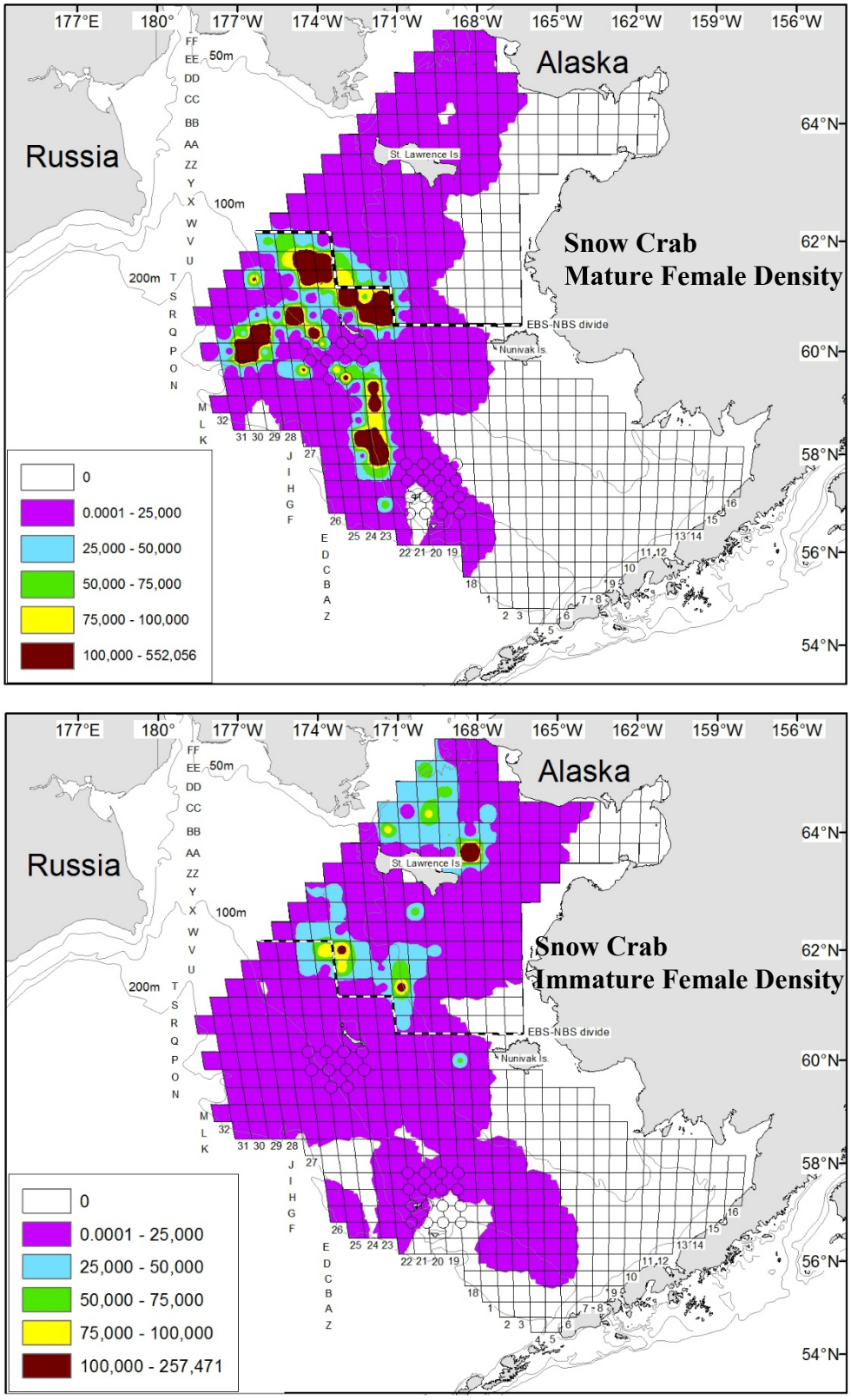


Figure 108b. -- Estimated total density (number nmi^{-2}) of mature female (top) and immature female (bottom) snow crab (*Chionoecetes opilio*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

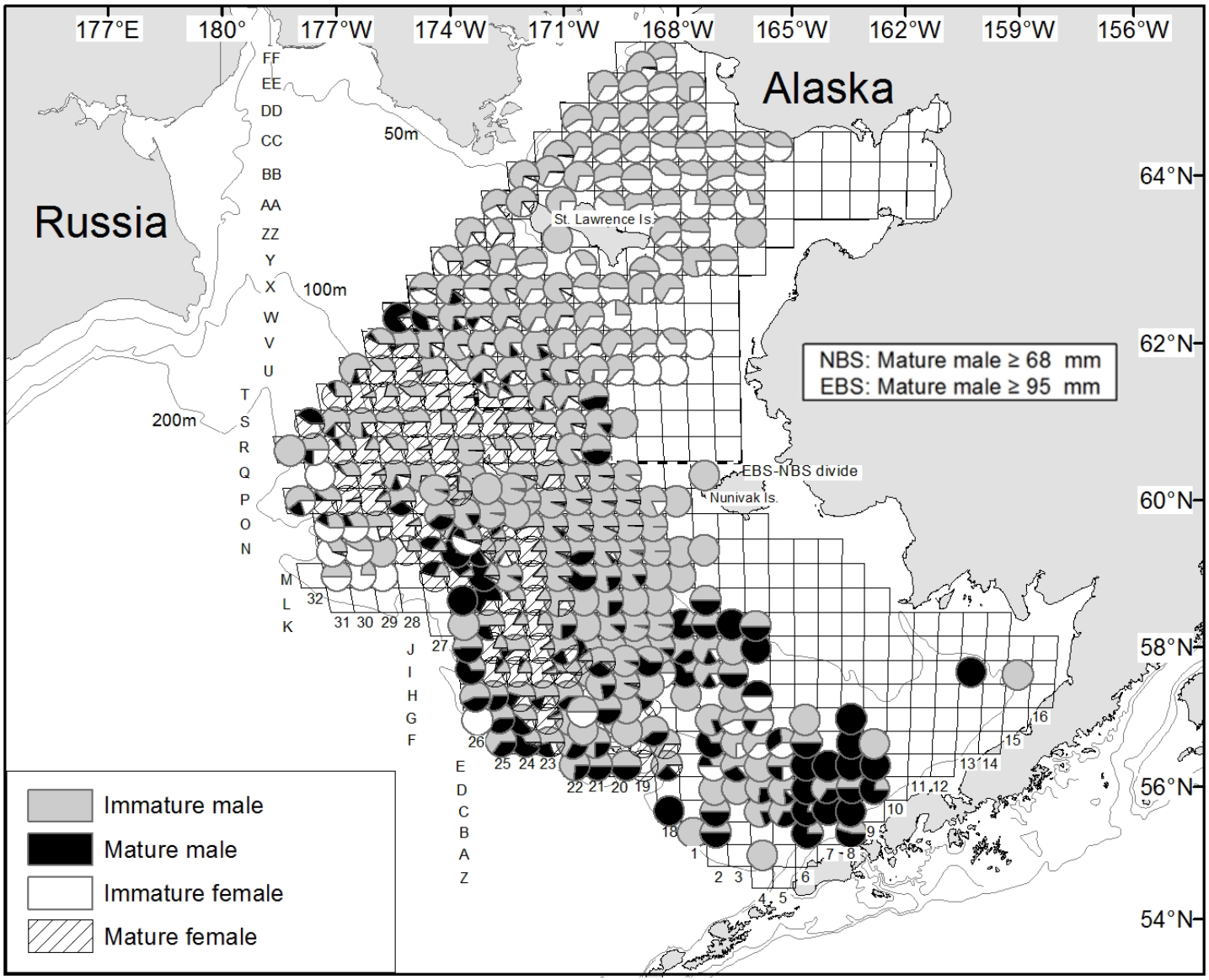


Figure 109. -- Proportion of male and female snow crab (*Chionoecetes opilio*) maturity classes caught at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019.

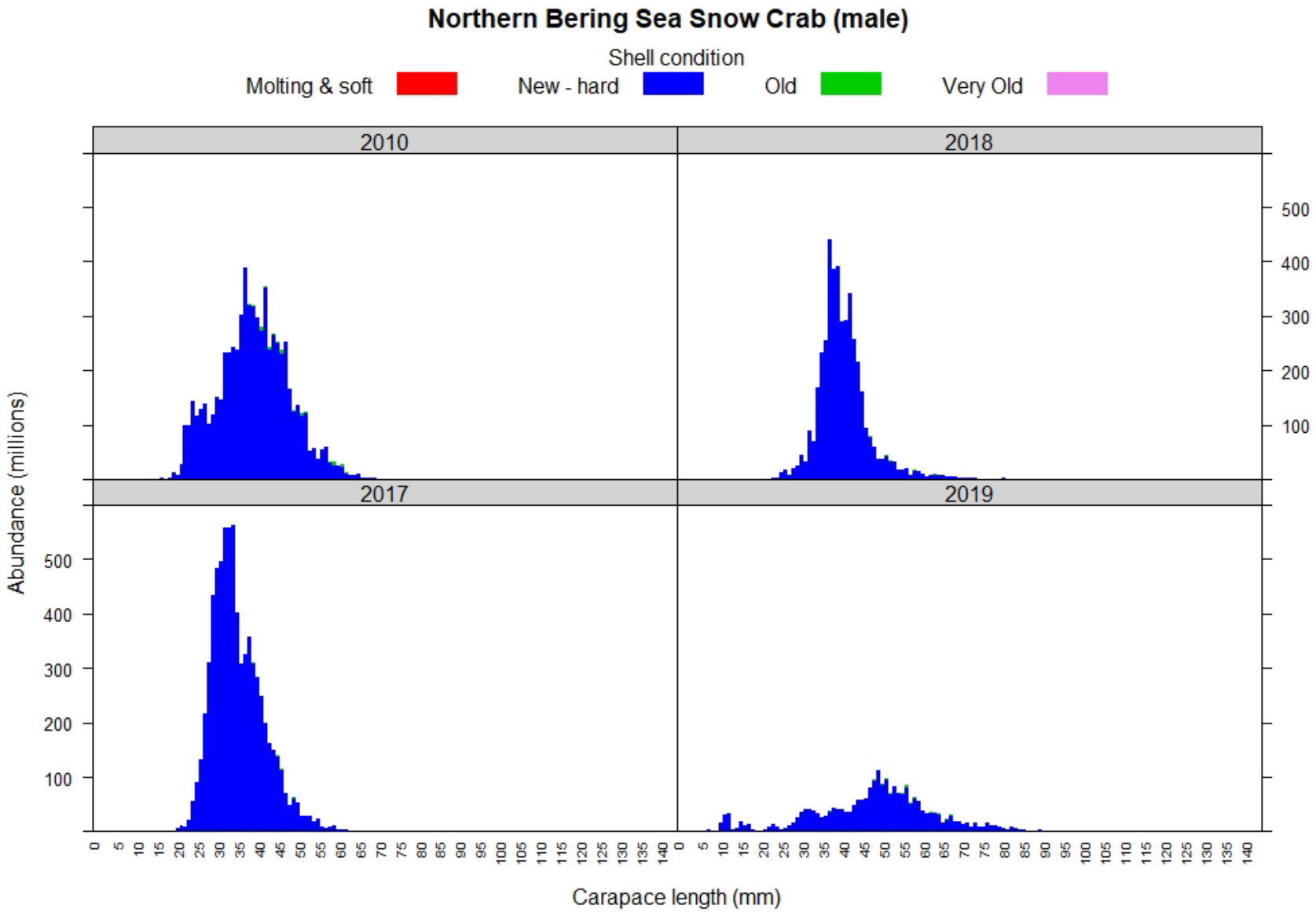


Figure 110. --Abundance (millions) by size and shell condition of male snow crab (*Chionoecetes opilio*) using 1 mm width classes for the northern Bering Sea in 2019.

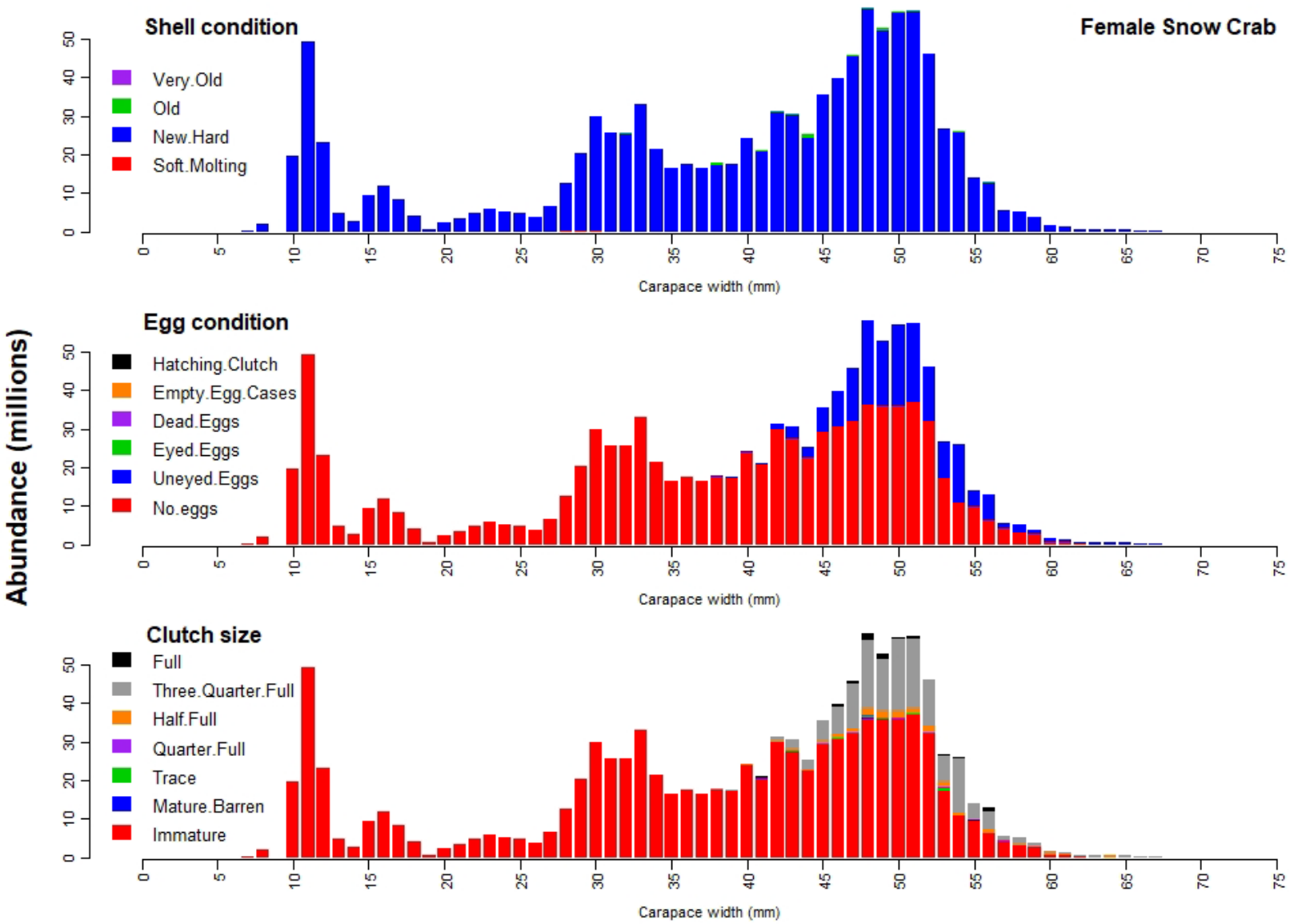


Figure 111. -- Size frequency by shell condition, egg condition, and clutch fullness of female snow crab (*Chionoecetes opilio*) by 1 mm width classes in the northern Bering Sea in 2019.

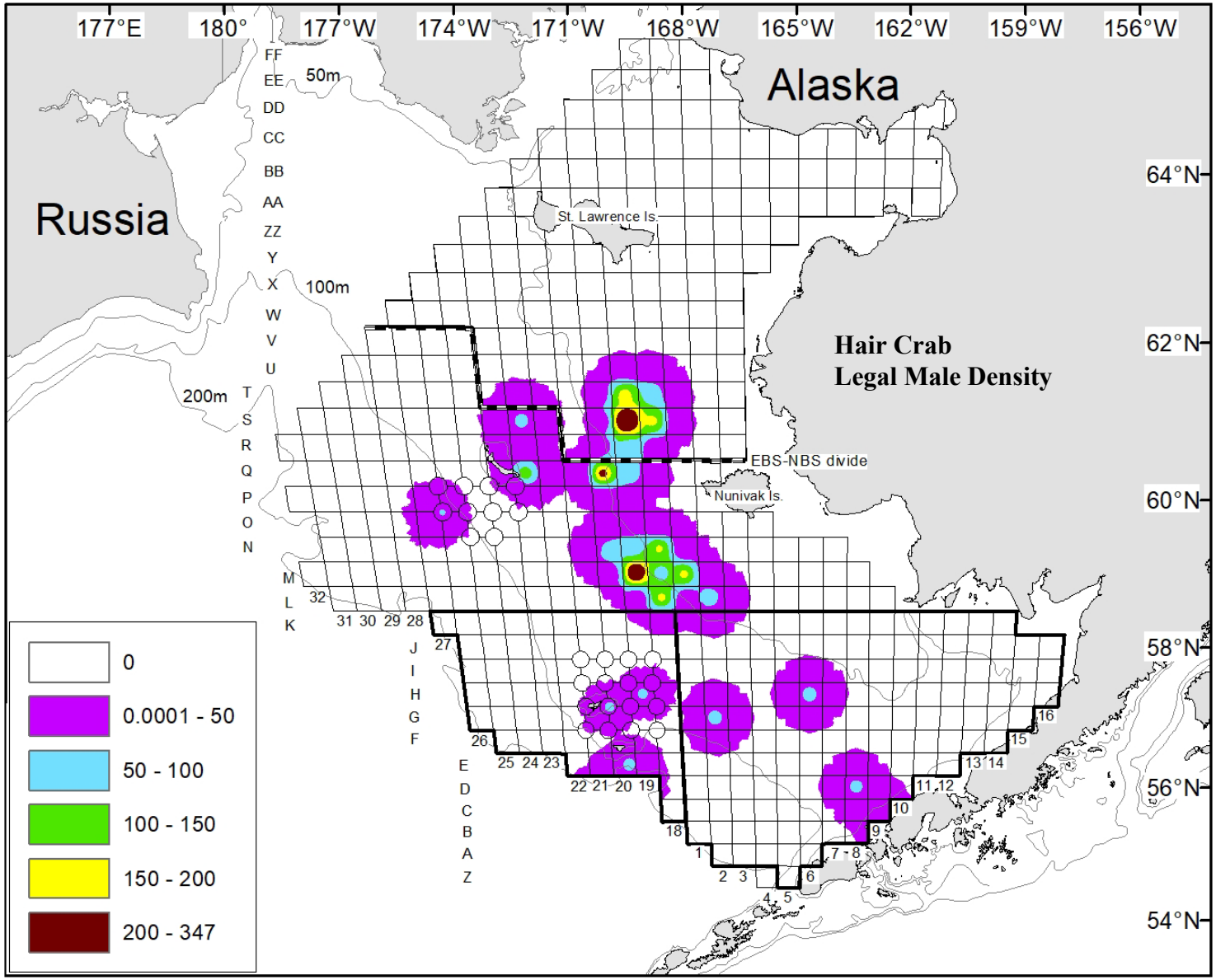


Figure 112. -- Estimated total density (number nmi^{-2}) of legal-sized male hair crab (*Erimacrus isenbeckii*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019 (legal size ≥ 83 mm).

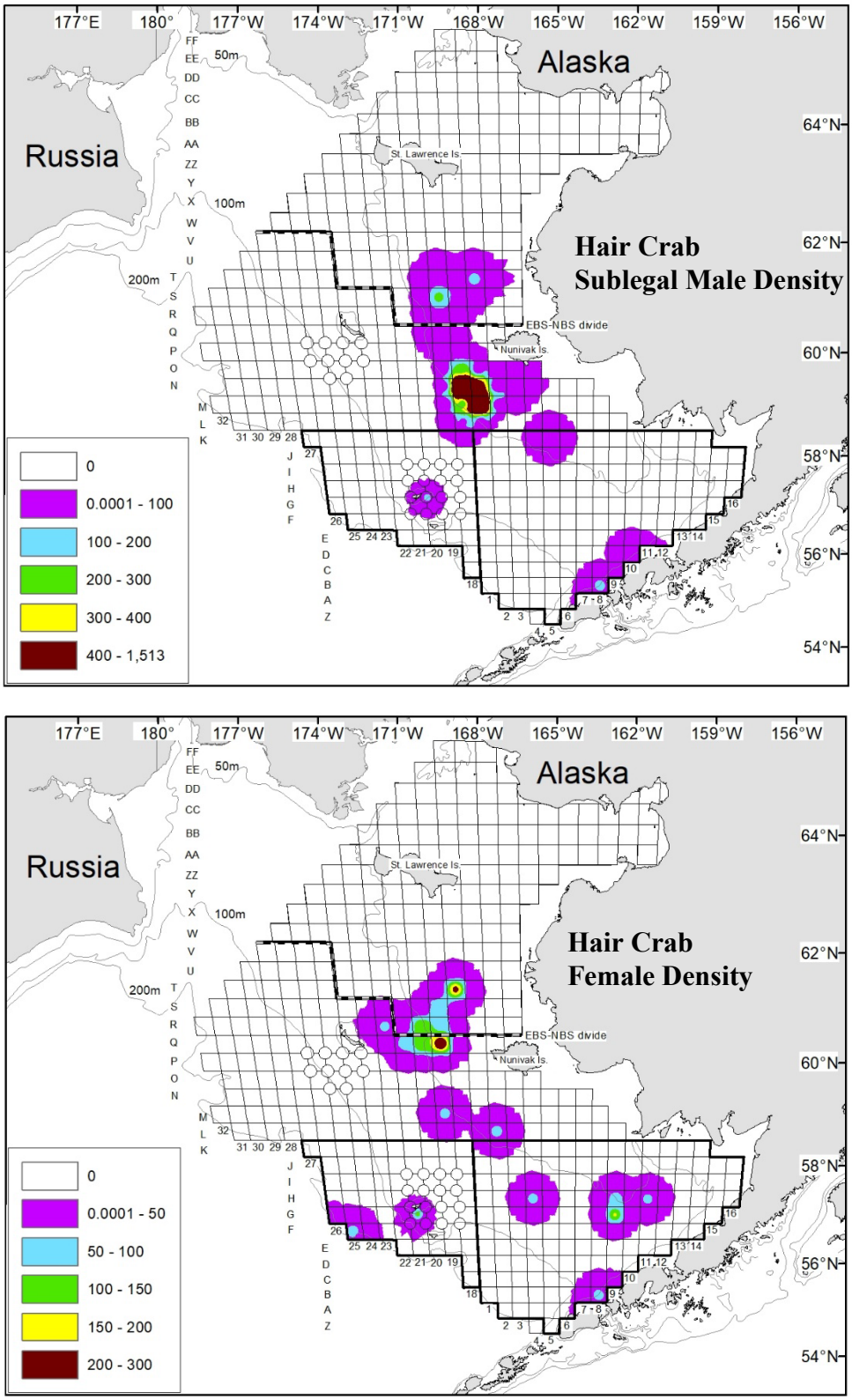


Figure 113. --Estimated total density (number nmi^{-2}) of sublegal male (top) and female (bottom) hair crab (*Erimacrus isenbeckii*) at each station sampled in the eastern Bering Sea and northern Bering Sea in 2019 (sublegal male < 83 mm).

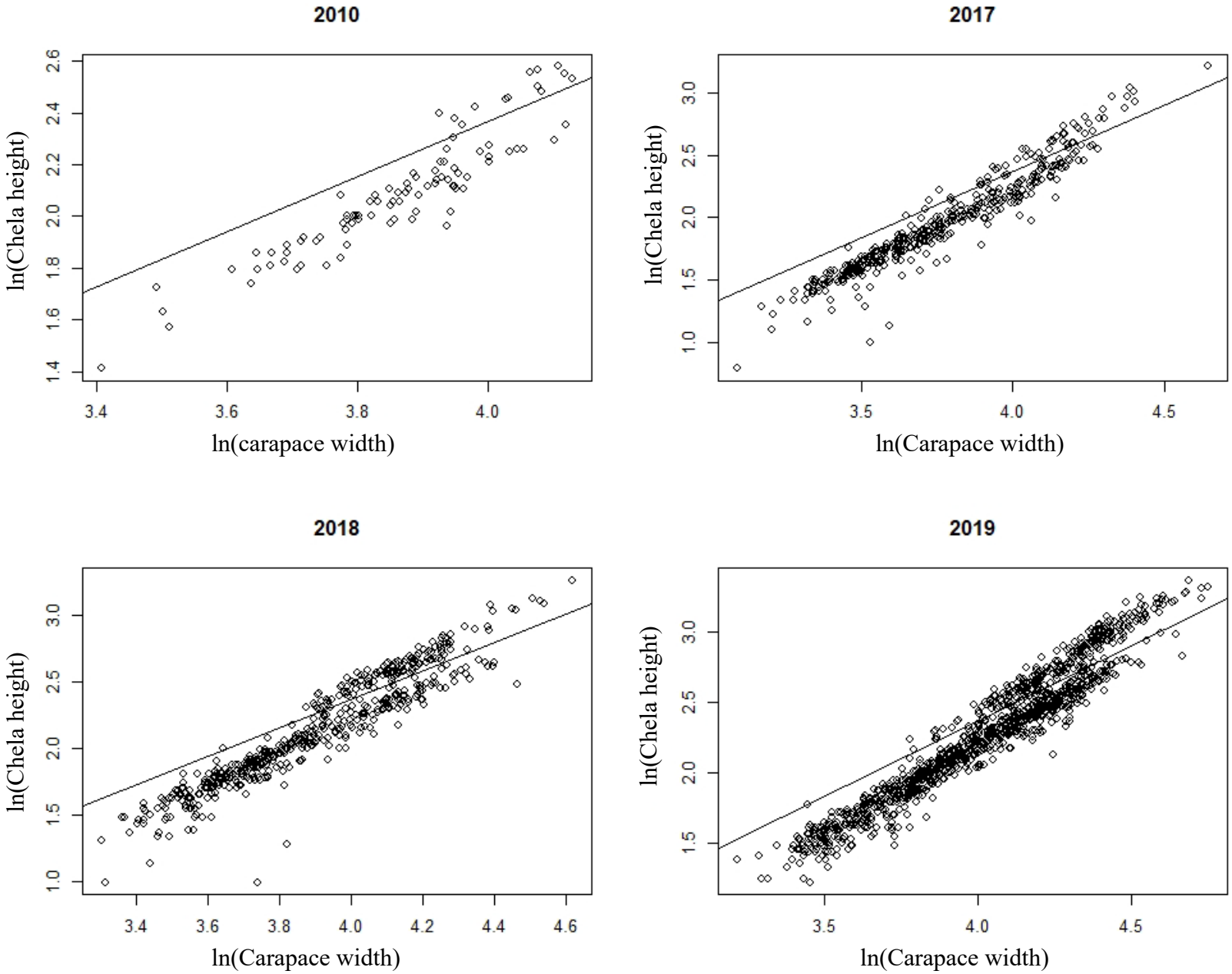


Figure 114. --Male snow crab (*Chionoecetes opilio*) chela height and carapace width measurement collected during the 2010, 2017, 2018, and 2019 northern Bering Sea bottom trawl surveys. Measurements are natural log-linearized. Black line is maturity cutline derived using distribution-based approach.

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	A-02	A-03	A-04	A-05	A-06	B-01	B-02	B-03	B-04	B-05	B-06
Start Date	6/23/2019	6/17/2019	6/18/2019	6/11/2019	6/9/2019	6/23/2019	6/23/2019	6/17/2019	6/17/2019	6/11/2019	6/9/2019
Duration (hour)	0.49	0.52	0.5	0.52	0.52	0.54	0.49	0.54	0.48	0.52	0.51
Distance Fished (km)	2.64	2.72	2.72	2.79	2.85	2.97	2.72	2.8	2.69	2.74	2.88
Mid-Latitude (ºN)	55	55.01	55.01	55	55.04	55.35	55.35	55.35	55.34	55.32	55.34
Mid-Longitude (ºW)	-166.93	-166.35	-165.74	-165.16	-164.58	-167.56	-166.97	-166.36	-165.79	-165.16	-164.56
Bottom Depth (m)	156	143	130	112	64	148	140	132	119	110	101
Bottom Temperature (ºC)	4.5	4.7	4.6	5.1	5.9	4.6	4.6	4.7	5.1	4.9	5.3
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	2,790	1,508	3,927	505	0	6,909	3,747	4,746	2,322	137	72
Mature males	204	548	0	0	0	1,063	375	330	888	273	0
Legal	136	343	0	0	0	1,063	187	330	819	205	0
Immature females	1,497	686	4,527	577	0	3,255	4,184	2,636	2,663	546	72
Mature females	1,429	5,141	133	0	0	8,171	3,372	330	1,366	0	0
Total weight (kg)	9.15	18.03	3.78	0.36	0.00	37.54	21.87	12.94	21.39	3.69	0.42
Snow Crab											
Immature males	0	0	67	0	0	133	62	0	0	0	143
Mature males	0	0	0	0	0	0	62	0	0	0	501
Legal	0	0	67	0	0	66	125	0	0	0	644
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.23	0.00	0.00	0.47	0.51	0.00	0.00	0.00	3.76
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	66	187	66	0	0	0
Males ≥ 78 mm	0	0	67	72	0	0	0	0	68	0	143
Immature females	0	206	0	0	0	0	125	0	0	0	0
Mature females	0	0	0	0	0	0	62	0	0	0	0
Total weight (kg)	0.00	0.16	0.72	0.52	0.00	0.15	0.34	0.04	0.70	0.00	1.11

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	B-07	B-08	C-01	C-02	C-03	C-04	C-05	C-06	C-07	C-08	C-09
Start Date	6/9/2019	6/9/2019	6/23/2019	6/23/2019	6/17/2019	6/17/2019	6/11/2019	6/11/2019	6/11/2019	6/8/2019	6/8/2019
Duration (hour)	0.52	0.52	0.54	0.49	0.51	0.49	0.52	0.52	0.52	0.52	0.42
Distance Fished (km)	2.86	2.91	2.77	2.67	2.79	2.68	2.78	2.81	2.72	2.89	2.35
Mid-Latitude (ºN)	55.34	55.34	55.67	55.66	55.67	55.66	55.66	55.67	55.69	55.66	55.67
Mid-Longitude (ºW)	-164.02	-163.41	-167.58	-166.98	-166.4	-165.8	-165.17	-164.57	-164.01	-163.42	-162.83
Bottom Depth (m)	78	53	135	135	126	117	109	97	95	80	51
Bottom Temperature (ºC)	5.7	5.4	4.4	4.5	4.7	4.8	4.8	5.2	5.1	4.9	4.9
Red King Crab											
Immature males	0	141	0	0	0	0	0	0	0	0	0
Mature males	0	70	0	0	0	0	0	0	0	0	0
Legal	0	70	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	70	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	6.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	17,809	207	2,914	863	7,145	10,771	145	147	217	0
Mature males	0	1,760	207	518	199	1,159	2,443	435	515	290	95
Legal	0	774	69	324	199	1,159	2,084	290	515	145	95
Immature females	0	3,308	69	1,684	1,128	14,590	6,898	290	74	145	0
Mature females	0	1,267	346	2,137	1,924	837	2,156	73	74	0	0
Total weight (kg)	0.00	77.66	2.42	20.15	9.90	39.84	68.65	5.27	6.16	3.49	0.55
Snow Crab											
Immature males	0	352	0	65	0	258	144	73	0	0	0
Mature males	0	422	0	65	0	64	72	290	221	72	0
Legal	0	563	0	130	0	129	144	363	221	72	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	4.30	0.00	0.65	0.00	1.18	1.07	2.65	1.60	0.71	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	64	0	73	0	0	0
Males ≥ 78 mm	0	141	0	65	0	129	0	73	0	0	0
Immature females	0	0	0	65	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	1.29	0.00	0.59	0.00	0.94	0.00	0.47	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	C-18	D-01	D-02	D-03	D-04	D-05	D-06	D-07	D-08	D-09	D-10
Start Date	6/23/2019	6/23/2019	6/23/2019	6/17/2019	6/17/2019	6/16/2019	6/16/2019	6/12/2019	6/10/2019	6/9/2019	6/8/2019
Duration (hour)	0.53	0.54	0.49	0.31	0.49	0.51	0.51	0.53	0.53	0.53	0.48
Distance Fished (km)	2.82	2.84	2.71	1.68	2.8	2.86	2.86	2.9	2.82	2.92	2.68
Mid-Latitude (ºN)	55.67	56.01	55.99	56	56.01	55.98	55.99	56	56.01	55.99	56
Mid-Longitude (ºW)	-168.18	-167.61	-167.01	-166.4	-165.79	-165.19	-164.58	-164.04	-163.39	-162.8	-162.28
Bottom Depth (m)	135	132	135	123	106	96	92	91	88	79	74
Bottom Temperature (ºC)	4.4	4.5	4.5	4.6	4.8	4.9	4.6	4.7	4.5	4.5	4.9
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	143	70	0
Legal	0	0	0	0	0	0	0	0	72	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	140	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.50	6.07	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	1,867	1,946	65	865	5,556	562	771	632	2,725	0	0
Mature males	207	201	324	433	1,181	211	0	211	860	140	0
Legal	138	201	259	433	972	211	0	211	717	140	0
Immature females	1,590	1,476	130	216	3,889	562	631	842	2,151	0	0
Mature females	553	403	259	0	1,042	0	0	0	645	0	0
Total weight (kg)	5.21	3.99	3.66	4.00	27.01	2.22	0.25	3.16	14.56	1.52	0.00
Snow Crab											
Immature males	0	0	65	108	556	492	0	140	215	140	0
Mature males	69	0	0	0	208	70	280	70	215	491	0
Legal	69	0	65	0	486	421	280	211	430	631	0
Immature females	0	0	0	0	0	70	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.50	0.00	0.24	0.13	3.37	2.05	1.99	1.03	2.30	4.30	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	69	70	0	140	287	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	1.03	0.74	0.00	0.98	2.09	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	D-18	E-01	E-02	E-03	E-04	E-05	E-06	E-07	E-08	E-09	E-10
Start Date	6/23/2019	6/24/2019	6/24/2019	6/17/2019	6/17/2019	6/17/2019	6/16/2019	6/12/2019	6/10/2019	6/9/2019	6/8/2019
Duration (hour)	0.52	0.51	0.5	0.52	0.51	0.5	0.49	0.51	0.53	0.54	0.52
Distance Fished (km)	2.75	2.72	2.83	2.88	2.87	2.67	2.73	2.7	2.86	2.82	2.89
Mid-Latitude (ºN)	56.01	56.34	56.34	56.33	56.32	56.34	56.34	56.33	56.34	56.34	56.33
Mid-Longitude (ºW)	-168.23	-167.64	-167.03	-166.41	-165.8	-165.21	-164.58	-164.01	-163.42	-162.79	-162.19
Bottom Depth (m)	150	128	113	103	92	86	86	86	85	78	78
Bottom Temperature (ºC)	4.4	4.6	4.6	4.7	4.8	4.2	4.3	4.5	4.3	4.3	4.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	74	0
Mature males	0	0	0	0	0	0	0	0	215	0	149
Legal	0	0	0	0	0	0	0	0	72	0	75
Immature females	0	0	0	0	0	0	0	0	0	74	75
Mature females	0	0	0	0	0	0	0	0	72	593	224
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.17	11.80	8.99
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	9,160	2,732	3,606	1,476	1,022	17,777	903	623	359	0	0
Mature males	72	273	744	134	136	915	75	233	646	297	75
Legal	72	273	677	67	136	610	75	156	646	148	75
Immature females	6,347	2,869	5,897	1,140	954	18,278	527	156	72	0	0
Mature females	144	0	338	402	0	76	0	0	0	0	0
Total weight (kg)	3.84	3.98	11.66	3.79	1.75	20.87	1.86	2.50	8.19	2.25	1.14
Snow Crab											
Immature males	0	0	135	268	272	305	0	0	0	0	0
Mature males	0	0	68	134	0	153	75	233	72	74	0
Legal	0	0	135	335	204	305	75	233	72	74	0
Immature females	0	0	203	67	0	153	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.74	1.86	0.87	1.78	0.32	1.80	0.44	0.36	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	150	0	0	0	0
Immature females	0	0	0	0	68	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.09	0.00	0.89	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	E-11	E-12	E-18	E-19	E-20	E-21	E-22	F-01	F-02	F-03	F-04
Start Date	6/6/2019	6/6/2019	6/24/2019	6/30/2019	6/30/2019	6/30/2019	6/30/2019	6/24/2019	6/24/2019	6/17/2019	6/16/2019
Duration (hour)	0.53	0.52	0.54	0.52	0.53	0.52	0.53	0.52	0.5	0.52	0.52
Distance Fished (km)	2.76	2.82	2.87	2.89	2.88	2.84	2.87	2.86	2.85	2.74	2.7
Mid-Latitude (ºN)	56.34	56.34	56.34	56.33	56.34	56.34	56.34	56.67	56.67	56.67	56.66
Mid-Longitude (ºW)	-161.61	-160.98	-168.25	-168.88	-169.32	-170.08	-170.67	-167.68	-167.07	-166.42	-165.86
Bottom Depth (m)	64	54	151	128	138	109	120	103	95	84	79
Bottom Temperature (ºC)	4.9	5.9	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.2	4
Red King Crab											
Immature males	228	0	0	0	0	0	0	0	0	0	0
Mature males	76	76	0	0	0	0	0	0	0	0	0
Legal	76	76	0	0	0	0	0	0	0	0	0
Immature females	76	0	0	0	0	0	0	0	0	0	0
Mature females	380	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	13.56	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	76	0	14,243	17,664	25,156	6,658	1,867	1,097	1,975	2,987	5,029
Mature males	228	76	2,909	398	136	815	133	0	0	448	155
Legal	228	0	2,706	265	136	747	0	0	0	448	155
Immature females	0	0	15,427	30,699	36,633	3,465	1,200	1,783	2,750	3,957	4,874
Mature females	0	0	338	663	4,163	2,174	267	0	71	0	155
Total weight (kg)	3	1	32	14	34	23	4	1	1	6	5
Snow Crab											
Immature males	0	0	338	0	68	204	733	0	71	224	387
Mature males	0	0	135	0	68	204	267	0	141	0	0
Legal	0	0	203	0	68	272	800	0	141	224	232
Immature females	0	0	0	0	0	0	0	0	0	75	232
Mature females	0	0	68	66	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	1.85	0.11	0.55	1.66	4.44	0.00	0.98	0.85	1.15
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	203	66	205	408	0	0	0	75	77
Males ≥ 78 mm	0	0	338	133	205	68	67	0	0	75	0
Immature females	0	0	0	0	0	204	0	0	0	0	0
Mature females	0	0	203	0	0	136	0	0	0	0	0
Total weight (kg)	0.00	0.00	3.44	1.03	1.99	2.10	0.54	0.00	0.00	0.38	0.01

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	F-05	F-06	F-07	F-08	F-09	F-10	F-11	F-12	F-13	F-14	F-18
Start Date	6/16/2019	6/16/2019	6/12/2019	6/10/2019	6/9/2019	6/7/2019	6/6/2019	6/6/2019	6/6/2019	6/5/2019	6/24/2019
Duration (hour)	0.53	0.52	0.52	0.54	0.52	0.51	0.53	0.53	0.54	0.53	0.52
Distance Fished (km)	2.82	2.81	2.78	2.83	2.78	2.83	2.74	2.79	2.83	2.84	2.86
Mid-Latitude (ºN)	56.67	56.67	56.67	56.66	56.66	56.67	56.66	56.67	56.67	56.68	56.65
Mid-Longitude (ºW)	-165.23	-164.58	-164.01	-163.4	-162.81	-162.18	-161.6	-160.96	-160.37	-159.72	-168.3
Bottom Depth (m)	76	75	75	75	72	71	88	71	60	35	107
Bottom Temperature (ºC)	3.9	3.9	4.1	4.1	4.2	4.6	4.6	5	5.5	7.7	4.5
Red King Crab											
Immature males	0	0	0	0	79	0	824	0	0	0	0
Mature males	146	151	226	147	159	0	1,199	73	0	83	0
Legal	146	151	150	147	159	0	525	0	0	0	0
Immature females	0	0	0	0	79	0	150	0	0	0	0
Mature females	0	0	150	368	556	231	899	73	0	0	0
Total weight (kg)	8.05	6.50	10.53	14.44	17.83	3.84	55.27	2.58	0.00	1.62	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	4,091	908	1,052	221	79	0	375	0	144	0	328
Mature males	438	681	75	515	477	154	2,024	514	144	0	262
Legal	365	303	75	515	397	154	2,024	441	144	0	262
Immature females	3,507	908	376	147	79	0	75	0	0	0	656
Mature females	438	151	0	0	0	0	75	73	72	0	0
Total weight (kg)	9.78	7.30	1.98	6.39	5.50	1.76	26.90	5.34	2.14	0.00	2.51
Snow Crab											
Immature males	292	76	0	0	79	0	0	0	0	0	131
Mature males	365	76	0	147	0	0	0	0	0	0	0
Legal	438	76	0	147	79	0	0	0	0	0	66
Immature females	438	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	66
Total weight (kg)	2.65	0.67	0.00	0.83	0.24	0.00	0.00	0.00	0.00	0.00	0.42
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	292	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	73	0	0	0	0	0	150	0	0	0	66
Immature females	146	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	66
Total weight (kg)	0.74	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.73

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	F-19	F-20	F-21	F-22	F-23	F-24	F-25	G-01	G-02	G-03	G-04
Start Date	6/30/2019	7/3/2019	7/1/2019	7/1/2019	7/9/2019	7/9/2019	7/14/2019	6/24/2019	6/24/2019	6/24/2019	6/25/2019
Duration (hour)	0.53	0.52	0.52	0.52	0.49	0.51	0.54	0.53	0.51	0.53	0.51
Distance Fished (km)	2.88	2.82	2.89	2.86	2.69	2.78	2.82	2.79	2.82	2.88	2.67
Mid-Latitude (ºN)	56.67	56.67	56.67	56.66	56.67	56.68	56.68	56.99	57	57	56.99
Mid-Longitude (ºW)	-168.9	-169.53	-170.13	-170.73	-171.35	-171.97	-172.61	-167.69	-167.09	-166.47	-165.84
Bottom Depth (m)	100	80	97	115	119	126	134	77	74	74	72
Bottom Temperature (ºC)	4.4	6.1	4.8	4.4	4.4	4.4	4.4	4.3	4.3	4.1	4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	5,413	294	608	1,313	442	798	19,408	291	2,477	1,631	1,378
Mature males	2,436	1,029	608	459	74	133	0	946	387	355	162
Legal	2,165	1,029	540	394	0	133	0	801	387	355	81
Immature females	7,782	0	135	985	369	665	30,486	437	929	1,560	973
Mature females	271	294	473	919	0	266	3,876	0	77	0	81
Total weight (kg)	27.97	11.24	9.98	8.96	1.72	2.08	22.23	8.41	5.94	4.58	2.28
Snow Crab											
Immature males	609	0	203	263	3,539	8,462	933	0	310	284	243
Mature males	68	0	68	131	1,769	15,232	502	0	77	0	81
Legal	406	0	68	328	4,423	23,356	1,292	0	310	142	81
Immature females	0	0	0	0	0	0	0	0	0	213	162
Mature females	812	0	0	0	1,253	1,463	0	0	0	0	0
Total weight (kg)	3.37	0.00	1.03	1.48	22.42	132.20	6.97	0.00	1.46	1.00	0.72
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	68	0	0	0	0	0	0	73	0	0	0
Males ≥ 78 mm	474	0	0	0	0	399	0	0	77	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	2,098	0	0	0	0	133	0	0	0	0	0
Total weight (kg)	7.51	0.00	0.00	0.00	0.00	3.84	0.00	0.29	0.41	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	G-05	G-06	G-07	G-08	G-09	G-10	G-11	G-12	G-13	G-14	G-15
Start Date	6/16/2019	6/15/2019	6/12/2019	6/11/2019	6/9/2019	6/7/2019	6/7/2019	6/5/2019	6/5/2019	6/4/2019	6/3/2019
Duration (hour)	0.52	0.5	0.51	0.52	0.54	0.52	0.53	0.53	0.54	0.52	0.53
Distance Fished (km)	2.81	2.73	2.77	2.73	2.81	2.88	2.77	2.79	2.84	2.81	2.87
Mid-Latitude (ºN)	57	57	57	57.01	57	57	57	57	57	57.01	57
Mid-Longitude (ºW)	-165.23	-164.61	-164.03	-163.41	-162.78	-162.16	-161.55	-160.95	-160.33	-159.7	-159.14
Bottom Depth (m)	71	69	69	65	60	61	69	66	63	54	35
Bottom Temperature (ºC)	3.9	4	4	4.1	4.8	4.9	4.8	4.8	5.2	5.7	7.3
Red King Crab											
Immature males	0	0	0	723	238	78	148	0	73	78	0
Mature males	74	77	673	482	397	389	148	147	73	0	0
Legal	74	77	673	321	318	233	74	73	0	0	0
Immature females	0	0	0	0	79	0	0	0	0	0	0
Mature females	0	0	252	2,249	1,192	233	295	293	367	233	0
Total weight (kg)	3.78	2.85	31.57	67.51	39.14	17.28	10.94	9.01	10.74	5.26	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	588	77	168	161	238	0	0	0	0	155	0
Mature males	294	307	168	161	397	156	148	0	73	155	0
Legal	147	230	168	161	238	78	148	0	73	155	0
Immature females	74	77	84	0	79	0	0	0	0	78	0
Mature females	74	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	4.78	3.46	2.09	2.17	4.83	1.21	1.58	0.00	0.88	1.64	0.00
Snow Crab											
Immature males	0	77	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	80	0	0	0	0	0	0	0
Legal	0	77	0	80	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.33	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	74	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	74	0	0	0	0	0	0	0	0	0	0
Immature females	147	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	G-18	G-19	G-20	G-21	G-22	G-23	G-24	G-25	G-26	GF1918	GF2019
Start Date	6/25/2019	6/29/2019	7/3/2019	7/3/2019	7/3/2019	7/9/2019	7/9/2019	7/14/2019	7/14/2019	6/29/2019	7/1/2019
Duration (hour)	0.52	0.55	0.52	0.55	0.52	0.52	0.5	0.53	0.49	0.52	0.3
Distance Fished (km)	2.74	2.89	2.68	3.01	2.92	2.85	2.62	2.94	2.7	2.82	1.63
Mid-Latitude (ºN)	57	57.01	57	57.02	57	57.01	57	57.02	56.99	56.83	56.84
Mid-Longitude (ºW)	-168.35	-168.94	-169.54	-170.2	-170.79	-171.39	-172.05	-172.66	-173.23	-168.6	-169.3
Bottom Depth (m)	81	79	61	65	95	109	118	121	141	97	80
Bottom Temperature (ºC)	4.3	4.3	5.3	5.8	4.9	4.6	4.4	4.3	4.3	4.4	4.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	123
Legal	0	0	0	0	0	0	0	0	0	0	123
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.34
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	123
Legal	0	0	0	0	0	0	0	0	0	0	123
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	986
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.88
Tanner Crab											
Immature males	380	441	762	8,024	8,111	136	375	2,452	6,366	273	616
Mature males	456	1,135	762	332	744	0	75	0	0	273	2,342
Legal	456	1,135	686	66	473	0	75	0	0	273	2,342
Immature females	380	63	457	5,637	6,894	0	75	1,771	21,557	546	123
Mature females	0	63	533	199	811	0	0	409	72	0	246
Total weight (kg)	3.93	13.56	8.89	12.20	19.91	0.45	1.01	4.32	4.17	3.10	14.22
Snow Crab											
Immature males	0	0	76	0	6,489	4,605	3,649	2,111	0	205	863
Mature males	0	0	0	0	338	4,498	4,220	1,498	0	136	0
Legal	0	0	0	0	4,123	7,649	7,071	3,337	0	273	616
Immature females	0	0	0	0	203	0	0	0	72	0	0
Mature females	0	63	0	0	0	68,448	1,348	0	0	0	0
Total weight (kg)	0.00	0.07	0.18	0.00	23.05	116.95	40.12	18.96	0.02	1.37	1.89
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	135	0	0	136	0	0	0
Males ≥ 78 mm	0	63	0	0	0	0	75	0	0	0	0
Immature females	0	0	0	0	135	0	0	68	0	0	0
Mature females	0	0	0	0	0	727	0	0	0	0	123
Total weight (kg)	0.00	0.58	0.00	0.00	0.31	1.42	0.46	0.07	0.00	0.00	0.11

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	GF2120	GF2221	H-01	H-02	H-03	H-04	H-05	H-06	H-07	H-08	H-09
Start Date	7/1/2019	7/1/2019	6/25/2019	6/25/2019	6/26/2019	6/25/2019	6/16/2019	6/15/2019	6/13/2019	6/11/2019	6/8/2019
Duration (hour)	0.52	0.52	0.52	0.51	0.52	0.51	0.52	0.5	0.52	0.52	0.53
Distance Fished (km)	2.77	2.78	2.84	2.82	2.74	2.73	2.67	2.82	2.83	2.94	2.75
Mid-Latitude (ºN)	56.84	56.85	57.34	57.34	57.33	57.33	57.33	57.33	57.34	57.33	57.34
Mid-Longitude (ºW)	-169.9	-170.46	-167.73	-167.11	-166.47	-165.87	-165.22	-164.62	-164	-163.38	-162.75
Bottom Depth (m)	72	100	73	70	70	68	68	66	63	53	48
Bottom Temperature (ºC)	5.5	4.6	3.8	3.9	3.7	3.7	3.7	3.6	4	5.3	6.2
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	215	79
Mature males	0	0	0	0	0	0	0	78	233	430	159
Legal	0	0	0	0	0	0	0	78	155	287	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	78	233	645	317
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.13	10.30	33.25	11.16
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	660	4,717	0	217	847	312	78	311	155	143	238
Mature males	293	694	296	72	539	78	0	311	0	215	159
Legal	220	624	222	72	385	0	0	156	0	215	159
Immature females	147	3,052	0	72	154	156	78	78	0	72	79
Mature females	73	1,873	0	72	0	0	0	0	155	0	0
Total weight (kg)	3.70	17.44	2.04	0.99	3.91	0.74	0.04	3.46	0.66	2.86	2.04
Snow Crab											
Immature males	0	971	74	0	154	0	0	0	0	0	0
Mature males	0	0	0	0	0	78	0	0	0	0	0
Legal	0	486	74	0	77	78	0	0	0	0	0
Immature females	0	0	0	0	0	78	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	2.81	0.23	0.00	0.41	0.48	0.00	0.00	0.00	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	72	154	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	78	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.18	0.49	0.00	0.00	0.00	0.72	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	H-10	H-11	H-12	H-13	H-14	H-15	H-16	H-18	H-19	H-20	H-21
Start Date	6/7/2019	6/7/2019	6/5/2019	6/4/2019	6/4/2019	6/3/2019	6/3/2019	6/25/2019	6/29/2019	7/3/2019	7/4/2019
Duration (hour)	0.5	0.52	0.53	0.54	0.53	0.53	0.48	0.5	0.52	0.53	0.35
Distance Fished (km)	2.7	2.83	2.79	2.94	2.91	2.83	2.58	2.75	2.69	2.86	1.87
Mid-Latitude (ºN)	57.34	57.32	57.34	57.33	57.34	57.35	57.34	57.32	57.34	57.32	57.33
Mid-Longitude (ºW)	-162.14	-161.55	-160.93	-160.3	-159.67	-159.06	-158.41	-168.38	-168.98	-169.6	-170.17
Bottom Depth (m)	52	56	63	61	55	49	32	74	71	61	53
Bottom Temperature (ºC)	5.7	5.8	4.6	5	5.5	6	7.4	4.1	4.3	4.4	7.2
Red King Crab											
Immature males	167	225	73	354	0	0	0	0	0	215	0
Mature males	167	225	218	71	0	0	0	0	77	646	0
Legal	0	150	73	0	0	0	0	0	77	72	0
Immature females	0	75	73	71	0	0	0	0	0	0	0
Mature females	1,171	750	291	637	0	0	0	0	0	72	0
Total weight (kg)	27.04	20.60	14.13	17.85	0.00	0.00	0.00	0.00	4.08	20.91	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	231	72	0
Mature males	0	0	0	0	0	0	0	0	77	0	0
Legal	0	0	0	0	0	0	0	0	77	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	231	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.18	0.47	0.00
Tanner Crab											
Immature males	251	0	0	71	0	0	0	78	384	2,511	0
Mature males	418	225	73	0	0	0	0	391	1,998	1,004	139
Legal	418	150	73	0	0	0	0	313	1,691	861	139
Immature females	0	0	0	0	0	0	0	0	461	1,076	0
Mature females	167	0	0	0	0	0	0	0	154	1,148	0
Total weight (kg)	4.25	1.80	0.70	0.21	0.00	0.00	0.00	3.26	16.88	15.69	0.50
Snow Crab											
Immature males	0	0	0	0	0	0	0	0	77	143	0
Mature males	0	0	0	0	0	0	0	0	77	0	0
Legal	0	0	0	0	0	0	0	0	77	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.29	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	72	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	72	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	H-22	H-23	H-24	H-25	H-26	HG1918	HG2019	HG2120	HG2221	I-01	I-02
Start Date	7/4/2019	7/9/2019	7/9/2019	7/14/2019	7/14/2019	6/29/2019	7/3/2019	7/4/2019	7/3/2019	6/28/2019	6/27/2019
Duration (hour)	0.51	0.29	0.54	0.54	0.5	0.53	0.51	0.51	0.5	0.51	0.53
Distance Fished (km)	2.75	1.54	2.77	2.98	2.72	2.84	2.73	2.82	2.96	2.82	2.83
Mid-Latitude (ºN)	57.34	57.34	57.33	57.34	57.33	57.17	57.16	57.16	57.12	57.68	57.66
Mid-Longitude (ºW)	-170.84	-171.47	-172.11	-172.82	-173.3	-168.63	-169.32	-169.85	-170.47	-167.76	-167.14
Bottom Depth (m)	82	100	109	117	120	76	73	53	49	69	68
Bottom Temperature (ºC)	5.5	4.4	4.2	4.2	4.3	4.5	4.5	7.2	7.2	3.9	3.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	373	0	0	0	0
Legal	0	0	0	0	0	0	149	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	224	0	158	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	14.81	0.00	2.04	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	1,005	2,004	501	1,200	1,590	215	672	387	2,452	390	469
Mature males	1,795	1,503	143	0	0	1,077	2,613	232	316	78	67
Legal	1,723	1,503	143	0	0	1,077	2,389	77	158	78	67
Immature females	646	2,881	286	1,533	1,084	72	448	77	475	312	67
Mature females	4,810	1,378	72	0	72	72	0	0	0	0	67
Total weight (kg)	33.11	11.34	1.26	0.86	3.30	9.86	23.96	2.18	5.69	0.99	1.83
Snow Crab											
Immature males	215	1,378	3,722	1,400	289	0	299	77	79	78	268
Mature males	144	376	1,646	600	217	0	0	77	0	156	67
Legal	215	1,253	4,724	1,600	506	0	75	155	79	156	67
Immature females	0	0	0	0	0	0	0	0	79	0	67
Mature females	0	752	2,863	0	0	0	0	0	0	0	0
Total weight (kg)	1.26	3.93	29.07	9.78	2.54	0.00	0.95	0.68	0.30	1.45	1.11
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	78	0
Males ≥ 78 mm	0	0	72	0	0	72	0	0	0	0	67
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	149	0	0	0	0
Total weight (kg)	0.00	0.00	0.59	0.00	0.00	0.48	0.19	0.00	0.00	0.03	0.40

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	I-03	I-04	I-05	I-06	I-07	I-08	I-09	I-10	I-11	I-12	I-13
Start Date	6/26/2019	6/25/2019	6/16/2019	6/15/2019	6/13/2019	6/11/2019	6/8/2019	6/7/2019	6/7/2019	6/5/2019	6/4/2019
Duration (hour)	0.52	0.51	0.53	0.5	0.51	0.53	0.52	0.51	0.52	0.52	0.52
Distance Fished (km)	2.85	2.87	2.79	2.84	2.74	2.93	2.88	2.73	2.78	2.69	2.84
Mid-Latitude (ºN)	57.66	57.67	57.67	57.66	57.66	57.67	57.67	57.67	57.66	57.66	57.68
Mid-Longitude (ºW)	-166.5	-165.88	-165.26	-164.63	-164.01	-163.39	-162.73	-162.13	-161.49	-160.88	-160.26
Bottom Depth (m)	66	64	61	53	52	47	44	47	53	56	54
Bottom Temperature (ºC)	3.8	3.8	4	5.2	6	6.6	6.6	6.2	5.4	5.1	5.5
Red King Crab											
Immature males	0	0	0	0	0	143	375	324	1,063	154	151
Mature males	72	71	225	80	84	357	450	406	683	0	151
Legal	72	71	225	0	84	143	375	243	304	0	0
Immature females	0	0	0	0	0	0	0	81	379	0	226
Mature females	0	0	75	240	0	571	525	649	2,049	539	151
Total weight (kg)	4.23	3.90	11.58	6.56	2.42	26.35	32.06	29.40	65.37	13.88	8.61
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	572	142	75	320	84	214	749	0	76	0	75
Mature males	0	71	225	0	84	71	75	0	379	154	75
Legal	0	0	150	0	84	0	75	0	379	154	75
Immature females	72	71	225	240	422	143	300	0	0	0	0
Mature females	215	0	75	0	0	0	75	0	0	0	0
Total weight (kg)	1.38	0.64	2.07	0.68	0.88	1.48	3.75	0.00	3.94	1.18	0.81
Snow Crab											
Immature males	72	0	0	0	0	0	0	0	0	0	0
Mature males	72	0	0	0	0	0	0	0	0	0	75
Legal	72	0	0	0	0	0	0	0	0	0	75
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	80	84	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.03	0.18	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	I-14	I-15	I-16	I-18	I-19	I-20	I-21	I-22	I-23	I-24	I-25
Start Date	6/4/2019	6/3/2019	6/3/2019	6/28/2019	6/30/2019	7/3/2019	7/5/2019	7/5/2019	7/9/2019	7/8/2019	7/14/2019
Duration (hour)	0.53	0.52	0.52	0.52	0.5	0.52	0.21	0.51	0.5	0.52	0.54
Distance Fished (km)	2.86	2.68	2.86	2.78	2.77	2.89	1.14	2.67	2.79	2.75	2.89
Mid-Latitude (ºN)	57.67	57.64	57.66	57.66	57.66	57.67	57.67	57.67	57.66	57.67	57.67
Mid-Longitude (ºW)	-159.63	-159.03	-158.34	-168.41	-169.03	-169.67	-170.28	-170.9	-171.54	-172.19	-172.78
Bottom Depth (m)	50	45	36	71	69	70	72	86	99	108	119
Bottom Temperature (ºC)	5.9	6.2	6.9	4	3.9	3.9	4.1	4.8	4.3	4.1	4.1
Red King Crab											
Immature males	0	0	0	0	0	216	0	0	0	0	0
Mature males	0	0	0	0	0	432	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	153	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	77	792	0	0	0	0	0
Total weight (kg)	0.40	0.00	0.00	0.00	1.08	27.98	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	77	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	454	2,230	2,590	201	6,313	1,157	152	3,099
Mature males	0	0	0	529	231	1,151	2,616	1,804	2,595	0	0
Legal	0	0	0	302	231	1,079	2,213	1,578	2,018	0	0
Immature females	0	0	0	227	1,615	1,583	0	4,284	1,013	0	689
Mature females	0	0	0	0	0	504	0	6,388	4,196	0	0
Total weight (kg)	0.00	0.00	0.00	4.62	3.02	12.33	7.40	29.78	32.66	0.00	4.45
Snow Crab											
Immature males	0	81	0	76	3,537	6,188	201	4,359	3,545	9,724	3,444
Mature males	0	0	0	76	2,384	1,223	0	526	2,312	3,343	2,342
Legal	0	81	0	76	4,075	3,598	0	1,879	4,265	8,965	4,408
Immature females	0	0	0	76	0	216	0	75	0	0	0
Mature females	0	0	0	0	0	72	0	4,359	61,192	49,822	20,046
Total weight (kg)	0.00	0.37	0.00	0.53	20.06	20.46	0.19	17.23	93.03	99.81	53.51
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	288	0	225	0	0	0
Males ≥ 78 mm	0	0	0	227	0	504	0	0	144	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	72	0	0	723	0	138
Total weight (kg)	0.00	0.00	0.00	1.18	0.00	4.10	0.00	0.04	2.25	0.00	0.23

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	I-26	IH1918	IH2019	IH2120	IH2221	J-01	J-02	J-03	J-04	J-05	J-06
Start Date	7/14/2019	6/29/2019	6/30/2019	7/4/2019	7/4/2019	6/28/2019	6/27/2019	6/26/2019	6/25/2019	6/15/2019	6/15/2019
Duration (hour)	0.54	0.52	0.45	0.51	0.5	0.51	0.52	0.53	0.52	0.51	0.51
Distance Fished (km)	3.08	2.75	2.39	2.75	2.82	2.85	2.77	2.87	2.81	2.61	2.87
Mid-Latitude (ºN)	57.71	57.5	57.51	57.5	57.49	57.99	57.99	58	58	58.01	58.01
Mid-Longitude (ºW)	-173.41	-168.73	-169.37	-169.99	-170.55	-167.81	-167.16	-166.52	-165.9	-165.25	-164.61
Bottom Depth (m)	147	72	71	69	73	67	63	61	56	50	46
Bottom Temperature (ºC)	4	4.2	4.2	4.4	5.4	3.7	3.6	4.2	4.8	6.3	6.6
Red King Crab											
Immature males	0	0	0	570	0	0	0	0	0	0	77
Mature males	0	151	0	976	0	0	0	71	150	247	0
Legal	0	151	0	407	0	0	0	71	75	247	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	448	325	75	0	0	284	675	165	0
Total weight (kg)	0.00	6.96	7.87	40.98	2.03	0.00	0.00	10.79	18.27	13.52	0.52
Blue King Crab											
Immature males	0	75	179	0	0	0	0	0	0	0	0
Mature males	0	0	90	0	0	0	0	0	0	0	0
Legal	0	0	90	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	1.18	4.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	33,071	376	28,649	1,465	905	74	440	355	75	82	154
Mature males	0	301	538	1,790	2,337	0	147	0	0	0	0
Legal	0	226	269	1,465	2,111	0	147	0	0	0	0
Immature females	39,418	75	30,956	488	829	0	73	142	0	0	77
Mature females	371	0	1,075	244	603	0	0	0	0	0	0
Total weight (kg)	20.75	3.14	11.48	19.54	23.98	0.07	1.92	1.02	0.26	0.30	0.57
Snow Crab											
Immature males	62	75	2,735	3,092	0	372	661	142	0	0	0
Mature males	124	0	90	895	0	223	147	0	75	0	0
Legal	124	0	179	2,034	0	297	294	71	75	0	0
Immature females	0	0	0	0	0	0	147	0	0	0	0
Mature females	0	0	90	0	0	0	0	0	0	0	0
Total weight (kg)	0.96	0.16	3.39	10.78	0.00	1.53	2.04	0.44	0.43	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	371	0	0	81	0	0	73	0	0	0	0
Males ≥ 78 mm	0	226	0	163	0	0	0	0	0	0	0
Immature females	371	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.09	1.81	0.00	0.88	0.00	0.00	0.07	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	J-07	J-08	J-09	J-10	J-11	J-12	J-13	J-14	J-15	J-16	J-18
Start Date	6/13/2019	6/11/2019	6/8/2019	6/6/2019	6/7/2019	6/6/2019	6/4/2019	6/4/2019	6/3/2019	6/3/2019	6/28/2019
Duration (hour)	0.51	0.53	0.52	0.51	0.53	0.53	0.53	0.53	0.52	0.52	0.52
Distance Fished (km)	2.78	2.91	2.91	2.74	2.81	2.95	2.86	2.8	2.78	2.82	2.76
Mid-Latitude (ºN)	57.99	58	58.01	57.99	58	58.01	58	58.01	57.99	57.99	58.01
Mid-Longitude (ºW)	-164.02	-163.38	-162.74	-162.11	-161.48	-160.87	-160.21	-159.6	-158.98	-158.32	-168.44
Bottom Depth (m)	48	44	41	36	55	46	51	42	39	36	70
Bottom Temperature (ºC)	6.1	6.2	6.6	6.3	6.1	6	6.1	6.5	6.5	6.8	3.5
Red King Crab											
Immature males	78	220	313	395	673	367	304	567	0	162	0
Mature males	155	367	391	158	822	294	0	0	0	0	0
Legal	78	0	156	0	374	147	0	0	0	0	0
Immature females	0	0	0	79	75	147	152	648	0	81	0
Mature females	78	293	469	158	75	147	76	0	0	0	154
Total weight (kg)	6.88	16.68	23.55	10.26	28.82	15.19	2.56	1.96	0.00	0.22	2.02
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	310	293	0	0	75	0	76	0	0	0	77
Mature males	155	0	0	0	75	0	0	0	0	0	0
Legal	78	0	0	0	75	0	0	0	0	0	0
Immature females	310	0	0	0	0	0	0	0	0	0	625
Mature females	0	73	0	0	0	0	0	0	0	0	0
Total weight (kg)	2.50	0.90	0.00	0.00	1.97	0.00	0.37	0.00	0.00	0.00	0.93
Snow Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	316,631
Mature males	0	0	0	0	0	0	0	0	0	0	43,280
Legal	0	0	0	0	0	0	0	0	0	0	109,718
Immature females	0	0	0	0	0	0	0	0	0	0	625
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	752.29
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	1,250
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	771
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.67

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	J-19	J-20	J-21	J-22	J-23	J-24	J-25	J-26	JI1918	JI2019	JI2120
Start Date	6/30/2019	7/4/2019	7/6/2019	7/6/2019	7/8/2019	7/8/2019	7/15/2019	7/15/2019	6/30/2019	7/4/2019	7/5/2019
Duration (hour)	0.5	0.51	0.36	0.34	0.51	0.53	0.54	0.53	0.5	0.52	0.33
Distance Fished (km)	2.77	2.7	1.94	1.85	2.72	2.83	2.9	2.84	2.72	2.73	1.78
Mid-Latitude (ºN)	58	57.99	58	58	58	57.99	58.01	58.02	57.83	57.83	57.82
Mid-Longitude (ºW)	-169.05	-169.69	-170.34	-170.98	-171.6	-172.25	-172.83	-173.49	-168.74	-169.36	-170.01
Bottom Depth (m)	70	70	74	87	97	105	109	116	70	66	72
Bottom Temperature (ºC)	3.3	3.3	4	4	3.9	3.7	3.9	3.9	3.7	3.9	3.7
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	77	0	0	0	0	0	0	237	230	256
Legal	0	77	0	0	0	0	0	0	0	0	256
Immature females	0	77	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	79	0	0
Total weight (kg)	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	6.55	4.99	7.18
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	1,421	308	213	1,456	1,168	1,118	8,658	1,945	317	2,099	384
Mature males	150	231	106	560	1,573	0	65	134	396	900	1,025
Legal	0	154	106	336	913	0	65	67	317	600	256
Immature females	299	154	426	560	0	639	5,750	3,152	0	1,499	768
Mature females	0	0	0	0	584	0	905	67	0	0	128
Total weight (kg)	0.93	2.17	1.11	3.79	14.80	1.83	12.57	2.64	3.19	9.88	4.27
Snow Crab											
Immature males	32,285	5,319	106	336	30,663	21,716	581	1,073	12,461	111,839	2,049
Mature males	646	2,852	106	112	7,563	3,503	0	1,006	18,496	8,896	1,153
Legal	6,548	5,859	213	336	27,717	16,579	258	1,878	26,868	31,772	2,049
Immature females	0	0	0	112	0	0	0	0	79	0	0
Mature females	0	0	106	0	330,198	16,928	2,584	0	0	0	384
Total weight (kg)	64.39	28.08	0.57	1.17	368.27	107.98	4.74	10.98	131.53	252.40	7.81
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	150	77	0	112	584	0	0	67	0	0	128
Males ≥ 78 mm	75	1,156	0	112	812	0	0	0	1,741	600	128
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	584	0	0	0	0	0	0
Total weight (kg)	0.83	7.80	0.00	0.62	5.84	0.00	0.00	0.02	11.14	4.09	0.78

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	JI2221	K-01	K-02	K-03	K-04	K-05	K-06	K-07	K-08	K-09	K-10
Start Date	7/5/2019	6/27/2019	6/27/2019	6/26/2019	6/25/2019	6/15/2019	6/15/2019	6/13/2019	6/11/2019	6/8/2019	6/6/2019
Duration (hour)	0.51	0.53	0.52	0.52	0.52	0.5	0.51	0.54	0.54	0.53	0.51
Distance Fished (km)	2.77	2.91	2.92	2.77	2.77	2.73	2.74	2.94	2.87	2.78	2.78
Mid-Latitude (ºN)	57.84	58.34	58.34	58.34	58.31	58.34	58.34	58.33	58.33	58.34	58.31
Mid-Longitude (ºW)	-170.61	-167.84	-167.19	-166.55	-165.91	-165.28	-164.65	-164.01	-163.36	-162.73	-162.04
Bottom Depth (m)	78	60	52	48	44	44	44	41	37	32	47
Bottom Temperature (ºC)	4.3	3.9	4.5	5.4	6.6	6.2	6.3	6.2	6.5	7.8	6.7
Red King Crab											
Immature males	0	0	0	0	0	0	79	0	0	0	0
Mature males	0	72	0	0	0	0	159	0	0	0	0
Legal	0	72	0	0	0	0	159	0	0	0	0
Immature females	0	0	0	76	0	0	0	0	0	0	75
Mature females	0	289	143	153	79	0	79	0	0	0	0
Total weight (kg)	0.00	9.85	3.11	2.33	2.17	0.00	9.89	0.00	0.00	0.00	0.21
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	1,727	724	430	0	79	166	317	0	0	0	0
Mature males	826	0	0	0	79	0	0	0	0	0	0
Legal	526	0	0	0	0	0	0	0	0	0	0
Immature females	0	145	72	0	0	83	79	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	9.64	2.04	0.92	0.00	0.86	0.62	0.67	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	375	1,086	72	0	79	0	0	0	0	0	0
Mature males	150	5,283	72	229	79	0	0	0	0	0	0
Legal	300	6,006	143	229	79	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	2,778	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	4.39	28.48	0.75	1.30	0.52	0.00	0.00	0.00	0.00	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	217	0	76	0	0	0	0	0	0	0
Males ≥ 78 mm	0	217	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	1.90	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	K-11	K-12	K-13	K-14	K-18	K-19	K-20	K-21	K-22	K-23	K-24
Start Date	6/6/2019	6/6/2019	6/4/2019	6/4/2019	6/28/2019	6/30/2019	7/4/2019	7/6/2019	7/6/2019	7/8/2019	7/8/2019
Duration (hour)	0.54	0.53	0.54	0.53	0.52	0.51	0.51	0.37	0.26	0.51	0.52
Distance Fished (km)	2.72	3.03	2.94	2.84	2.81	2.85	2.63	1.96	1.38	2.9	2.88
Mid-Latitude (ºN)	58.22	58.29	58.27	58.34	58.34	58.33	58.33	58.32	58.34	58.33	58.34
Mid-Longitude (ºW)	-161.54	-160.83	-159.99	-159.55	-168.46	-169.11	-169.73	-170.38	-171.01	-171.65	-172.3
Bottom Depth (m)	40	33	39	26	66	68	69	74	83	96	103
Bottom Temperature (ºC)	6.6	6.8	6.4	8.1	3.4	3.3	3.2	3.5	3.7	3.7	3.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	73	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	82	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.15	0.00	1.88	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	133	1,496	606	323	303	329	0
Mature males	0	0	0	0	0	136	0	108	0	0	0
Legal	0	0	0	0	0	136	0	108	0	0	0
Immature females	0	0	0	0	267	0	152	108	0	0	360
Mature females	0	0	0	0	0	0	0	0	0	659	360
Total weight (kg)	0.00	0.00	0.00	0.00	0.81	2.12	0.61	1.27	0.29	1.22	1.06
Snow Crab											
Immature males	0	0	0	0	76,060	118,074	25,731	323	455	27,011	36,793
Mature males	0	0	0	0	2,638	4,952	3,386	0	152	2,352	8,798
Legal	0	0	0	0	23,301	68,993	13,091	216	455	12,234	32,794
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	103,038	215,653
Total weight (kg)	0.00	0.00	0.00	0.00	158.33	307.79	73.28	0.60	0.95	153.63	312.98
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	667	299	758	0	0	329	0
Males ≥ 78 mm	0	0	0	0	0	0	909	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	329	0
Total weight (kg)	0.00	0.00	0.00	0.00	1.02	0.93	5.74	0.00	0.00	1.40	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	K-25	K-26	K-27	L-01	L-02	L-03	L-04	L-05	L-06	L-07	L-08
Start Date	7/15/2019	7/15/2019	7/15/2019	6/27/2019	6/26/2019	6/26/2019	6/26/2019	6/15/2019	6/14/2019	6/13/2019	6/14/2019
Duration (hour)	0.52	0.53	0.51	0.53	0.51	0.51	0.51	0.51	0.52	0.51	0.51
Distance Fished (km)	2.84	2.95	2.89	2.8	2.82	2.76	2.85	2.81	2.85	2.84	2.86
Mid-Latitude (ºN)	58.33	58.33	58.34	58.66	58.67	58.67	58.66	58.67	58.68	58.66	58.67
Mid-Longitude (ºW)	-172.92	-173.59	-174.29	-167.85	-167.22	-166.57	-165.94	-165.3	-164.65	-163.99	-163.34
Bottom Depth (m)	109	115	155	47	44	42	37	39	37	34	32
Bottom Temperature (ºC)	3.8	3.8	4	5.1	6	7	7.7	6.6	7.1	7.5	8.1
Red King Crab											
Immature males	0	0	0	0	0	0	0	78	0	0	0
Mature males	0	0	0	0	0	0	78	0	0	0	0
Legal	0	0	0	0	0	0	78	0	0	0	0
Immature females	0	0	0	75	0	0	0	0	0	0	0
Mature females	0	0	0	150	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	3.87	0.00	0.00	3.40	0.27	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	4,939	1,838	4,986	75	0	83	0	0	0	0	0
Mature males	203	0	0	0	0	0	0	0	0	0	0
Legal	135	0	0	0	0	0	0	0	0	0	0
Immature females	3,721	1,457	6,022	0	0	0	0	0	0	0	0
Mature females	338	253	65	0	0	0	0	0	0	0	0
Total weight (kg)	6.88	3.49	1.70	0.35	0.00	0.21	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	474	127	0	0	82	0	0	0	0	0	0
Mature males	271	0	0	0	82	0	0	0	0	0	0
Legal	541	127	0	0	82	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	203	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	2.89	0.54	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	75	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	68	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.01	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	L-09	L-18	L-19	L-20	L-21	L-22	L-23	L-24	L-25	L-26	L-27
Start Date	6/8/2019	6/29/2019	6/29/2019	7/4/2019	7/7/2019	7/6/2019	7/8/2019	7/8/2019	7/15/2019	7/16/2019	7/15/2019
Duration (hour)	0.54	0.51	0.51	0.53	0.45	0.34	0.52	0.52	0.55	0.54	0.53
Distance Fished (km)	2.76	2.58	2.72	2.81	2.38	1.89	2.85	2.77	3.07	2.94	2.92
Mid-Latitude (ºN)	58.68	58.67	58.67	58.66	58.67	58.66	58.67	58.68	58.67	58.67	58.67
Mid-Longitude (ºW)	-162.7	-168.49	-169.14	-169.78	-170.43	-171.08	-171.71	-172.38	-172.99	-173.62	-174.27
Bottom Depth (m)	22	53	63	66	73	82	92	102	112	127	157
Bottom Temperature (ºC)	8	4.4	3.2	3.1	3	3.4	3.6	3.4	3.7	3.8	3.8
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	82	0	0	0	0	0	0	0	0	0
Legal	0	82	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	327	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	8.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	219	0	108	775	2,297	3,638	5,609	5,324
Mature males	0	0	0	0	0	0	0	0	185	0	0
Legal	0	0	0	0	0	0	0	0	123	0	0
Immature females	0	0	0	0	0	0	581	933	2,960	8,486	3,143
Mature females	0	0	0	0	0	0	0	359	555	308	192
Total weight (kg)	0.00	0.00	0.00	0.18	0.00	0.21	1.46	5.76	7.92	2.78	3.83
Snow Crab											
Immature males	0	121,598	146,697	11,215	535	4,428	17,046	6,890	0	0	0
Mature males	0	572	762	3,645	0	0	0	1,579	123	62	0
Legal	0	7,196	15,191	12,337	89	1,512	7,554	4,880	123	62	0
Immature females	0	0	445	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	1,620	98,706	15,921	62	0	0
Total weight (kg)	0.00	162.82	242.60	47.19	0.95	8.08	115.73	42.28	1.00	0.44	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	292	0	216	0	0	0	0	0
Males ≥ 78 mm	0	0	0	512	0	0	0	72	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	3.40	0.00	0.33	0.00	0.56	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	L-28	L-29	L-30	L-31	M-01	M-02	M-03	M-04	M-05	M-06	M-07
Start Date	7/22/2019	7/22/2019	7/22/2019	7/22/2019	6/27/2019	6/26/2019	6/14/2019	6/15/2019	6/15/2019	6/14/2019	6/14/2019
Duration (hour)	0.55	0.54	0.5	0.52	0.51	0.51	0.51	0.52	0.53	0.51	0.51
Distance Fished (km)	2.86	3.01	2.67	2.85	2.74	2.79	2.76	2.84	2.87	2.86	2.91
Mid-Latitude (ºN)	58.75	58.68	58.67	58.66	58.99	59	59.01	59	59	58.99	59.01
Mid-Longitude (ºW)	-174.94	-175.55	-176.18	-176.81	-167.9	-167.23	-166.57	-165.92	-165.29	-164.64	-164
Bottom Depth (m)	141	135	139	136	42	40	34	31	29	27	27
Bottom Temperature (ºC)	3.8	3.7	3.6	3.4	6.2	6.4	6.8	7.4	7.6	8.2	8.1
Red King Crab											
Immature males	0	0	0	0	83	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	79	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	1.10	0.00	0.00	0.25	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	1,316	1,738	485	131	83	82	0	0	0	0	0
Mature males	0	186	0	0	0	0	0	0	0	0	0
Legal	0	62	0	0	0	0	0	0	0	0	0
Immature females	1,776	1,933	969	197	0	0	0	0	0	0	0
Mature females	0	17,302	69	0	0	0	0	0	0	0	0
Total weight (kg)	0.77	38.80	0.84	0.11	0.01	0.15	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	0	0	0	580	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	166	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	1,552	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	2.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	M-08	M-18	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27
Start Date	6/14/2019	6/29/2019	7/5/2019	7/6/2019	7/7/2019	7/7/2019	7/8/2019	7/8/2019	7/15/2019	7/16/2019	7/22/2019
Duration (hour)	0.53	0.52	0.52	0.52	0.49	0.35	0.5	0.54	0.53	0.53	0.53
Distance Fished (km)	2.96	2.71	2.73	2.76	2.72	1.89	2.75	2.84	2.91	2.87	2.77
Mid-Latitude (ºN)	58.99	59.01	59.01	59	59	59	59	59	59	58.99	58.99
Mid-Longitude (ºW)	-163.34	-168.53	-169.17	-169.84	-170.48	-171.12	-171.79	-172.44	-173.07	-173.72	-174.37
Bottom Depth (m)	23	46	54	63	70	77	87	98	106	118	127
Bottom Temperature (ºC)	9.3	5.5	4.4	3.1	3	2.8	3.2	3.4	3.4	3.6	3.7
Red King Crab											
Immature males	0	0	76	0	0	0	0	0	0	0	0
Mature males	0	0	76	0	0	0	0	0	0	0	0
Legal	0	0	76	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	79	76	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	1.14	4.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	79	0	0	8,471	1,040	1,140	4,566
Mature males	0	0	0	0	0	112	0	0	260	63	0
Legal	0	0	0	0	0	112	0	0	260	0	0
Immature females	0	0	0	0	0	0	0	4,550	390	1,330	1,937
Mature females	0	0	0	0	0	0	0	280	0	127	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.22	0.52	0.00	13.40	4.97	2.58	4.85
Snow Crab											
Immature males	0	87,198	5,181	4,260	4,497	14,337	23,923	840	260	760	138
Mature males	0	0	914	1,121	6,548	448	0	70	1,170	2,154	208
Legal	0	1,264	4,191	3,886	9,782	5,600	6,698	280	1,430	2,787	346
Immature females	0	352	0	75	0	0	319	0	65	63	0
Mature females	0	0	0	0	0	1,344	163,281	0	65	5,005	415
Total weight (kg)	0.00	119.26	17.73	16.48	43.51	23.96	144.17	2.28	10.78	26.69	2.79
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	152	0	0	0	0	210	0	0	0
Males ≥ 78 mm	0	0	152	0	158	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	1.20	0.00	0.74	0.00	0.00	0.18	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	M-28	M-29	M-30	M-31	M-32	N-01	N-02	N-03	N-04	N-05	N-06
Start Date	7/22/2019	7/23/2019	7/22/2019	7/23/2019	7/22/2019	6/27/2019	6/13/2019	6/13/2019	6/14/2019	6/14/2019	6/14/2019
Duration (hour)	0.56	0.55	0.49	0.48	0.49	0.51	0.51	0.53	0.53	0.53	0.54
Distance Fished (km)	3.03	3	2.58	2.64	2.64	2.76	2.69	2.87	2.8	3.09	3.1
Mid-Latitude (ºN)	59.01	59	59.02	59	58.99	59.33	59.35	59.34	59.34	59.32	59.33
Mid-Longitude (ºW)	-175	-175.73	-176.3	-176.94	-177.53	-167.91	-167.27	-166.62	-165.96	-165.32	-164.65
Bottom Depth (m)	130	134	137	136	134	40	32	29	24	21	23
Bottom Temperature (ºC)	3.6	3.4	3.2	3.3	3.5	6	6.4	7.1	8.5	9.2	9.7
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	3,415	2,572	2,153	4,349	282	0	0	0	0	0	0
Mature males	62	0	0	0	0	0	0	0	0	0	0
Legal	62	0	0	0	0	0	0	0	0	0	0
Immature females	1,800	2,195	1,722	4,563	988	0	0	0	0	0	0
Mature females	621	376	72	0	0	0	0	0	0	0	0
Total weight (kg)	7.02	3.63	2.31	4.44	0.28	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	0	144	356	0	244	76	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	72	143	0	81	76	0	0	0	0
Immature females	0	63	502	356	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.01	0.43	0.87	0.00	0.38	0.26	0.00	0.00	0.00	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	125	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	N-07	N-18	N-19	N-20	N-21	N-22	N-23	N-24	N-25	N-26	N-27
Start Date	6/14/2019	6/29/2019	7/5/2019	7/6/2019	7/7/2019	7/7/2019	7/8/2019	7/16/2019	7/15/2019	7/16/2019	7/20/2019
Duration (hour)	0.52	0.5	0.52	0.53	0.52	0.52	0.51	0.53	0.54	0.54	0.54
Distance Fished (km)	2.91	2.77	2.83	2.81	2.94	2.82	2.84	2.84	2.83	2.95	2.77
Mid-Latitude (ºN)	59.34	59.34	59.35	59.33	59.34	59.33	59.33	59.33	59.33	59.32	59.33
Mid-Longitude (ºW)	-163.99	-168.55	-169.23	-169.87	-170.54	-171.18	-171.83	-172.5	-173.15	-173.8	-174.45
Bottom Depth (m)	22	41	50	61	68	75	79	88	100	111	120
Bottom Temperature (ºC)	9.5	5.3	4.1	3.1	2.8	2.6	2.8	3.2	3.2	3.2	3.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	74	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	148	0	0	0	0	2,931	9,750	1,917	342
Mature males	0	0	0	0	0	0	0	0	69	0	0
Legal	0	0	0	0	0	0	0	0	69	0	0
Immature females	0	0	0	0	0	0	0	2,181	6,463	1,979	68
Mature females	0	0	0	0	0	0	0	0	138	124	68
Total weight (kg)	0.00	0.00	0.50	0.00	0.00	0.00	0.00	1.58	7.50	2.28	0.59
Snow Crab											
Immature males	0	16,653	16,473	150,923	38,803	15,278	23,887	1,227	1,268	62	68
Mature males	0	0	800	9,499	29,379	661	72	68	1,723	618	137
Legal	0	757	3,039	75,989	62,084	2,351	3,366	545	2,550	680	205
Immature females	0	239	516	358	0	73	549	273	166	0	0
Mature females	0	159	74	21,485	214	955	140,888	341	482	0	274
Total weight (kg)	0.00	21.83	29.51	391.37	277.08	29.42	126.58	4.25	17.21	6.99	1.18
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	622	0	549	0	0	0	0
Males ≥ 78 mm	0	0	74	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.43	0.00	1.41	0.00	0.98	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	N-28	N-29	N-30	N-31	O-01	O-02	O-03	O-04	O-18	O-19	O-20
Start Date	7/20/2019	7/23/2019	7/23/2019	7/23/2019	6/27/2019	6/13/2019	6/13/2019	6/13/2019	6/29/2019	7/5/2019	7/6/2019
Duration (hour)	0.51	0.54	0.54	0.49	0.52	0.52	0.53	0.52	0.51	0.52	0.51
Distance Fished (km)	2.71	2.91	2.9	2.68	2.84	2.92	2.96	2.98	2.82	2.84	2.79
Mid-Latitude (ºN)	59.34	59.33	59.34	59.33	59.67	59.67	59.67	59.65	59.67	59.67	59.67
Mid-Longitude (ºW)	-175.1	-175.75	-176.38	-177.06	-167.95	-167.27	-166.65	-165.93	-168.62	-169.27	-169.91
Bottom Depth (m)	131	137	136	149	35	31	28	23	39	48	57
Bottom Temperature (ºC)	3.4	3.2	3	3.2	7.2	5.9	7.7	8.8	5.1	4.1	3.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	74	0
Legal	0	0	0	0	0	0	0	0	0	74	0
Immature females	0	0	0	0	0	0	0	0	0	74	0
Mature females	0	0	0	0	0	0	0	0	0	295	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.10	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	351	875	1,674	1,152	0	0	0	0	0	0	0
Mature males	0	67	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	351	538	1,808	864	0	0	0	0	0	0	0
Mature females	211	135	67	432	0	0	0	0	0	0	0
Total weight (kg)	0.66	2.72	3.08	3.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	140	336	335	504	0	0	0	0	36,520	20,353	94,860
Mature males	0	0	0	0	0	0	0	0	0	188	571
Legal	0	269	67	72	0	0	0	0	3,652	4,334	16,001
Immature females	70	0	469	936	0	0	0	0	388	0	298
Mature females	421	0	0	72	0	0	0	0	78	221	7,218
Total weight (kg)	0.46	1.03	0.62	0.87	0.00	0.00	0.00	0.00	52.71	37.04	151.89
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	201	72	0	0	0	0	0	148	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	67	0	0	0	0	0	0	0	0	0
Mature females	0	67	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.15	0.16	0.06	0.00	0.00	0.00	0.00	0.00	0.35	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	O-21	O-22	O-23	O-24	O-25	O-26	O-27	O-28	O-29	O-30	O-31
Start Date	7/7/2019	7/17/2019	7/17/2019	7/16/2019	7/18/2019	7/16/2019	7/20/2019	7/20/2019	7/23/2019	7/23/2019	7/23/2019
Duration (hour)	0.52	0.52	0.53	0.53	0.53	0.46	0.54	0.51	0.54	0.54	0.47
Distance Fished (km)	2.77	2.77	2.95	2.84	2.86	2.57	2.85	2.73	2.97	2.94	2.56
Mid-Latitude (ºN)	59.67	59.67	59.66	59.67	59.66	59.67	59.66	59.67	59.67	59.66	59.66
Mid-Longitude (ºW)	-170.58	-171.25	-171.88	-172.56	-173.23	-173.85	-174.45	-175.11	-175.87	-176.5	-177.13
Bottom Depth (m)	67	72	78	84	96	105	115	125	137	136	176
Bottom Temperature (ºC)	2.7	2.7	2.6	2.8	2.9	2.9	3.3	3.4	3.2	2.4	3.3
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	66	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	71	0	0	0	0	0	0	0
Legal	0	0	0	71	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	811	0	0	1,827	402	4,885
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	442	0	0	2,254	201	4,359
Mature females	0	0	0	0	0	0	0	0	61	0	977
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	1.36	0.00	0.00	2.39	0.22	6.64
Snow Crab											
Immature males	53,158	12,655	60,137	183,457	9,555	295	7,859	4,422	609	134	150
Mature males	1,674	1,079	4,058	3,870	2,768	147	2,777	898	0	67	75
Legal	22,603	3,307	30,329	86,432	7,183	295	5,610	2,280	0	67	75
Immature females	153	0	0	0	0	0	0	0	305	201	301
Mature females	2,684	1,007	51,651	71,222	96,274	0	105,647	48,575	244	0	0
Total weight (kg)	114.22	30.05	191.48	490.79	122.83	1.66	121.54	47.32	0.73	0.77	0.55
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	297	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	1,305	0	0	0	75
Total weight (kg)	0.00	0.00	0.00	0.61	0.00	0.00	0.80	0.00	0.00	0.00	0.06

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	ON2524	ON2625	P-01	P-18	P-19	P-20	P-21	P-22	P-23	P-24	P-25
Start Date	7/16/2019	7/16/2019	6/27/2019	6/27/2019	7/5/2019	7/6/2019	7/7/2019	7/17/2019	7/17/2019	7/18/2019	7/18/2019
Duration (hour)	0.53	0.52	0.53	0.51	0.54	0.52	0.52	0.52	0.38	0.52	0.53
Distance Fished (km)	2.86	2.95	3.15	2.8	2.97	2.79	2.77	2.8	2.02	2.88	2.91
Mid-Latitude (ºN)	59.5	59.48	60	60	60	60	60.02	59.98	60	59.99	60
Mid-Longitude (ºW)	-172.88	-173.51	-168	-168.65	-169.33	-169.96	-170.64	-171.3	-171.95	-172.67	-173.27
Bottom Depth (m)	94	103	26	39	47	54	64	69	66	67	75
Bottom Temperature (ºC)	3	3.1	7.2	5	3.9	3.1	2.7	2.4	2.5	2.5	2.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	150	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	75	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	4.55	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	98	65	587
Mature males	0	0	0	0	0	0	0	0	0	258	848
Legal	0	0	0	0	0	0	0	0	0	194	522
Immature females	0	0	0	0	0	0	0	0	0	0	196
Mature females	0	0	0	0	0	0	0	0	0	129	130
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	9.12	26.67
Tanner Crab											
Immature males	68	3,094	0	0	0	0	0	0	0	0	65
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	751	884	0	0	0	0	0	0	0	0	0
Mature females	0	63	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.53	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Snow Crab											
Immature males	17,347	379	74	240,512	2,363	23,911	40,718	6,084	27,994	105,298	50,880
Mature males	17,709	189	0	80	0	651	1,380	207	784	951	928
Legal	30,053	253	0	80	573	7,645	12,768	346	14,219	25,197	25,426
Immature females	0	632	0	56,606	0	0	151	0	0	194	130
Mature females	116,165	63	0	2,660	72	827	1,435	138	0	194	130
Total weight (kg)	247.41	1.92	0.05	206.70	4.37	45.88	78.96	10.80	48.32	208.26	116.67
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	P-26	P-27	P-28	P-29	P-30	P-31	P-32	PO2423	PO2524	PO2625	PO2726
Start Date	7/17/2019	7/20/2019	7/20/2019	7/24/2019	7/24/2019	7/24/2019	7/23/2019	7/17/2019	7/16/2019	7/18/2019	7/17/2019
Duration (hour)	0.53	0.52	0.49	0.53	0.54	0.54	0.48	0.53	0.35	0.53	0.54
Distance Fished (km)	2.84	2.9	2.66	2.87	2.83	2.94	2.56	2.91	1.92	2.96	3.05
Mid-Latitude (ºN)	60.02	60	60	60	60	60.01	60.01	59.83	59.84	59.83	59.82
Mid-Longitude (ºW)	-173.94	-174.6	-175.24	-175.92	-176.68	-177.21	-177.9	-172.25	-172.9	-173.55	-174.23
Bottom Depth (m)	96	108	117	129	142	136	141	76	80	95	108
Bottom Temperature (ºC)	2.6	2.7	3.1	3.1	1.9	2.6	2.7	2.3	2.4	2.7	2.7
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	344	1,112	63	0
Legal	0	0	0	0	0	0	0	275	505	63	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	101	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.76	17.29	3.68	0.00
Tanner Crab											
Immature males	0	195	70	0	68	0	0	0	0	313	766
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	520	0	0	0	0	0	0	0	0	589
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.30	0.08	0.00	0.28	0.00	0.00	0.00	0.00	0.08	0.23
Snow Crab											
Immature males	7,744	3,447	771	4,298	24,364	269	233	267,533	122,519	22,921	1,060
Mature males	762	715	421	2,231	2,190	67	78	2,014	2,735	4,423	648
Legal	4,316	2,602	841	3,795	18,090	202	78	55,437	64,229	21,900	1,531
Immature females	0	260	0	0	0	0	78	525	0	251	59
Mature females	762	7,912	140	38,233	552,444	336	0	2,100	541	188	0
Total weight (kg)	30.85	22.61	6.06	60.25	578.30	1.66	1.03	492.06	203.01	102.00	10.08
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	347	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	Q-01	Q-02	Q-18	Q-19	Q-20	Q-21	Q-22	Q-23	Q-25	Q-26	Q-27
Start Date	6/28/2019	6/28/2019	6/28/2019	6/28/2019	7/6/2019	7/7/2019	7/18/2019	7/18/2019	7/19/2019	7/17/2019	7/20/2019
Duration (hour)	0.51	0.52	0.53	0.51	0.52	0.53	0.52	0.53	0.25	0.53	0.55
Distance Fished (km)	2.94	2.89	2.97	2.84	2.79	2.89	2.9	2.9	1.34	2.91	2.93
Mid-Latitude (ºN)	60.33	60.34	60.34	60.34	60.33	60.33	60.34	60.33	60.3	60.32	60.33
Mid-Longitude (ºW)	-167.98	-167.26	-168.66	-169.31	-170.03	-170.66	-171.34	-172.06	-173.38	-174.07	-174.72
Bottom Depth (m)	32	31	36	43	52	62	66	59	63	91	103
Bottom Temperature (ºC)	8	8.9	6.1	3.5	2.9	2.6	2.2	2.1	2.8	2.5	2.4
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	4,105	739	0	0
Mature males	0	0	0	0	0	0	0	1,322	443	0	0
Legal	0	0	0	0	0	0	0	1,044	443	0	0
Immature females	0	0	0	0	0	0	0	3,548	296	0	0
Mature females	0	0	0	0	0	0	0	1,878	148	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.93	7.74	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	68	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	150	0	118,262	75,614	98,948	35,359	38,624	2,956	10,889	8,687
Mature males	0	0	0	0	0	0	0	0	148	519	175
Legal	0	0	0	0	1,719	9,819	1,610	780	1,922	4,342	2,682
Immature females	0	0	0	9,820	966	685	612	0	0	194	0
Mature females	0	0	0	775	1,337	20,108	18,510	2,435	148	173,957	3,148
Total weight (kg)	0.00	0.16	0.00	103.07	94.81	160.15	66.69	53.64	4.04	147.97	32.05
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	70	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	Q-28	Q-29	Q-30	Q-31	QP2423	QP2524	QP2625	QP2726	R-22	R-23	R-24
Start Date	7/20/2019	7/25/2019	7/25/2019	7/24/2019	7/18/2019	7/19/2019	7/17/2019	7/17/2019	7/18/2019	7/19/2019	7/19/2019
Duration (hour)	0.51	0.53	0.53	0.53	0.53	0.54	0.52	0.56	0.53	0.54	0.53
Distance Fished (km)	2.69	2.75	2.74	2.89	2.93	2.99	2.76	3.07	2.79	2.86	2.86
Mid-Latitude (ºN)	60.34	60.34	60.33	60.33	60.16	60.17	60.13	60.15	60.66	60.67	60.67
Mid-Longitude (ºW)	-175.39	-176.03	-176.7	-177.36	-172.34	-173	-173.76	-174.36	-171.43	-172.11	-172.75
Bottom Depth (m)	111	121	136	148	58	60	87	101	63	61	45
Bottom Temperature (ºC)	2.6	3.1	1.9	2.3	3.6	2.9	2.6	2.5	2.2	2	4.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	1,175	381	0	0	0	0	73
Mature males	0	0	0	0	1,175	0	546	0	0	0	0
Legal	0	0	0	0	783	0	477	0	0	0	0
Immature females	0	0	0	0	849	763	0	0	0	0	0
Mature females	0	0	0	0	131	318	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	41.65	6.63	13.37	0.00	0.00	0.00	0.74
Tanner Crab											
Immature males	71	0	0	134	65	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	67	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.01	0.00	0.00	0.06	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	1,624	21,755	20,392	0	4,439	268,818	24,459	11,450	68,759	81,647	1,616
Mature males	282	2,920	3,343	0	131	0	2,038	653	141	69	0
Legal	1,412	14,679	14,531	0	1,110	12,708	17,936	8,069	2,563	1,856	147
Immature females	353	0	0	134	65	890	0	0	2,286	1,738	367
Mature females	71	292,951	37,636	0	0	2,543	82,795	0	285,991	150,690	3,819
Total weight (kg)	7.58	293.26	124.64	0.02	8.36	393.14	140.21	49.80	285.08	213.40	4.24
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	R-25	R-26	R-27	R-28	R-29	R-30	R-31	R-32	S-22	S-23	S-24
Start Date	7/19/2019	7/19/2019	7/26/2019	7/26/2019	7/25/2019	7/25/2019	7/26/2019	7/26/2019	7/18/2019	7/19/2019	7/19/2019
Duration (hour)	0.52	0.52	0.53	0.52	0.53	0.55	0.49	0.47	0.54	0.53	0.53
Distance Fished (km)	2.74	2.75	2.92	2.69	2.84	2.93	2.7	2.54	2.89	2.88	2.9
Mid-Latitude (ºN)	60.66	60.67	60.67	60.67	60.67	60.67	60.67	60.65	61	61	61
Mid-Longitude (ºW)	-173.47	-174.12	-174.83	-175.45	-176.2	-176.82	-177.54	-178.17	-171.48	-172.16	-172.81
Bottom Depth (m)	65	86	97	106	119	129	148	160	60	64	66
Bottom Temperature (ºC)	2.9	2.4	2.4	2.3	2.5	2.5	1.7	3	2.1	1.9	2.3
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	149	0	0	0
Mature males	0	0	69	0	0	0	0	0	0	0	0
Legal	0	0	69	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	72	74	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.53	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.00
Snow Crab											
Immature males	6,743	2,901	19,482	3,616	4,280	1,430	143	223	105,130	64,832	35,294
Mature males	0	73	344	217	408	520	72	0	0	0	0
Legal	0	725	5,626	2,604	2,718	1,559	72	0	4,658	982	447
Immature females	0	0	0	0	0	0	72	0	9,591	3,315	1,340
Mature females	71	14,083	293,941	6,726	22,777	3,314	0	0	135,950	68,411	227,241
Total weight (kg)	7.23	13.39	249.72	17.42	30.89	13.65	0.45	0.02	218.34	122.49	193.47
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	S-25	S-26	S-27	S-28	S-29	S-30	S-31	T-25	T-26	T-27	T-28
Start Date	7/19/2019	7/26/2019	7/27/2019	7/26/2019	7/25/2019	7/27/2019	7/27/2019	7/27/2019	7/27/2019	7/27/2019	7/27/2019
Duration (hour)	0.52	0.53	0.53	0.53	0.53	0.48	0.47	0.5	0.52	0.51	0.49
Distance Fished (km)	2.86	2.69	2.8	2.84	2.84	2.67	2.6	2.78	2.8	2.74	2.72
Mid-Latitude (ºN)	61	60.99	61.01	61.01	61	61.01	61	61.33	61.34	61.34	61.34
Mid-Longitude (ºW)	-173.49	-174.19	-174.88	-175.56	-176.28	-176.98	-177.65	-173.6	-174.33	-175	-175.68
Bottom Depth (m)	75	83	91	102	112	122	136	74	79	87	98
Bottom Temperature (ºC)	2.2	2.2	2.2	1.9	2.1	2.3	1.5	0.8	1.7	1.6	1.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	74	0	0	0	0
Mature males	0	0	0	0	68	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	74	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.39	0.00	0.08	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	6,449	381	639	4,064	1,698	362	0	4,809	13,512	336	214
Mature males	0	0	0	0	136	72	1,561	0	217	0	0
Legal	755	228	426	689	1,222	217	1,561	178	2,475	67	0
Immature females	830	0	71	0	0	72	0	534	608	0	0
Mature females	39,017	1,066	639	4,409	407	72	2,305	103,362	150,984	537	784
Total weight (kg)	43.10	1.50	2.47	12.73	6.58	1.29	16.93	83.90	148.86	1.14	0.80
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	T-29	T-30	U-25	U-26	U-27	U-28	U-29	V-25	V-26	V-27	V-28
Start Date	7/27/2019	7/25/2019	7/28/2019	7/28/2019	7/28/2019	7/27/2019	7/25/2019	7/28/2019	7/28/2019	7/28/2019	7/28/2019
Duration (hour)	0.48	0.52	0.5	0.52	0.49	0.49	0.28	0.52	0.5	0.5	0.5
Distance Fished (km)	2.61	2.89	2.72	2.84	2.64	2.66	1.48	2.65	2.76	2.74	2.78
Mid-Latitude (ºN)	61.33	61.34	61.67	61.67	61.66	61.66	61.68	61.99	62.01	62	62
Mid-Longitude (ºW)	-176.31	-176.95	-173.67	-174.43	-175.08	-175.77	-176.45	-173.75	-174.5	-175.17	-175.81
Bottom Depth (m)	106	115	71	77	85	95	104	64	74	80	91
Bottom Temperature (ºC)	1.9	2.2	0.7	0.3	1	1.5	1.8	1	-0.3	0.4	1.2
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	9,256	199	73,317	373,311	5,174	1,387	1,731	549,795	265,617	88,363	32,814
Mature males	147	66	75	9,559	67	0	247	239	16,751	11,561	7,721
Legal	2,130	132	5,423	164,557	1,075	252	1,237	40,617	110,543	65,240	28,568
Immature females	0	0	8,180	44,438	67	0	0	98,405	38,216	575	0
Mature females	105,689	463	137,553	238,433	90,419	2,333	495	7,344	26,893	70,071	54,203
Total weight (kg)	97.68	1.24	203.51	1066.18	99.27	5.33	4.18	650.74	683.54	368.52	216.45
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 eastern Bering Sea bottom trawl survey stations.

Station	Z-05
Start Date	6/9/2019
Duration (hour)	0.32
Distance Fished (km)	1.63
Mid-Latitude (ºN)	54.7
Mid-Longitude (ºW)	-165.14
Bottom Depth (m)	83
Bottom Temperature (ºC)	5.9
Red King Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Blue King Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Tanner Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Snow Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Chionoecetes spp. Hybrid	
Males ≤ 77 mm	0
Males ≥ 78 mm	0
Immature females	0
Mature females	0
Total weight (kg)	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	AA-01	AA-02	AA-03	AA-04	AA-05	AA-06	AA-07	AA-08	AA-18	AA-19	AA-21
Start Date	8/13/2019	8/13/2019	8/11/2019	8/11/2019	8/7/2019	8/7/2019	8/7/2019	8/7/2019	8/8/2019	8/8/2019	8/11/2019
Duration (hour)	0.53	0.52	0.52	0.52	0.53	0.54	0.52	0.52	0.51	0.50	0.28
Distance Fished (km)	2.85	2.80	2.80	2.84	2.87	3.16	2.84	2.75	2.86	2.67	1.52
Mid-Latitude (ºN)	63.67	63.67	63.67	63.67	63.66	63.67	63.67	63.67	63.67	63.66	63.7
Mid-Longitude (ºW)	-168.27	-167.51	-166.79	-166.06	-165.31	-164.57	-163.81	-163.05	-169.01	-169.75	-171.03
Bottom Depth (m)	33	29	30	27	18	12	15	15	36	39	21
Bottom Temperature (ºC)	3.1	4.0	5.7	10.2	12.0	13.0	13.8	13.9	6.3	7.2	8.3
Red King Crab											
Immature males	0	0	1,366	732	168	0	0	0	0	0	0
Mature males	0	0	76	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	455	220	84	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	7.84	4.06	0.6	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	275049	968	1822	146	0	0	0	0	1921	2135	882
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	257593	3276	1822	366	0	0	0	0	1441	3331	294
Mature females	71	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	10.58	0.11	0.09	0.06	0	0.00	0	0.00	0.13	0.19	0.14
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	AA-22	AA-23	BB-01	BB-02	BB-03	BB-04	BB-05	BB-06	BB-07	BB-08	BB-09
Start Date	8/13/2019	8/13/2019	8/7/2019	8/7/2019	8/11/2019	8/11/2019	8/4/2019	8/4/2019	8/5/2019	8/5/2019	8/6/2019
Duration (hour)	0.23	0.52	0.51	0.50	0.52	0.51	0.52	0.52	0.51	0.52	0.53
Distance Fished (km)	1.09	2.88	2.77	2.83	2.70	2.82	2.89	2.82	2.68	2.73	2.99
Mid-Latitude (ºN)	63.7	63.66	64.01	64	64	64	64.01	64	64	64	64
Mid-Longitude (ºW)	-172.06	-172.72	-168.28	-167.57	-166.81	-166.06	-165.32	-164.55	-163.77	-163.06	-162.32
Bottom Depth (m)	35	56	37	35	32	24	18	19	20	20	18
Bottom Temperature (ºC)	0.7	0.3	3.0	4.0	5.1	10.2	12.7	13.2	10.5	10.7	13.0
Red King Crab											
Immature males	0	0	0	0	1157	414	1635	1221	375	0	164
Mature males	0	0	0	0	77	83	82	0	0	0	82
Legal	0	0	0	0	77	0	0	0	0	0	82
Immature females	0	0	0	0	0	165	981	732	187	0	164
Mature females	0	0	0	0	0	248	82	81	0	0	164
Total weight (kg)	0	0	0.00	0.00	5.96	3.88	9.93	6.00	1.29	0.00	2.97
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	2112	41505	4,745	22013	2237	331	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	384	20186	7,362	26984	1774	414	0	0	0	0	0
Mature females	384	10467	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.51	37.06	0.46	6.06	0.44	0.16	0.00	0	0	0	0.00
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	BB-10	BB-18	BB-19	BB-20	BB-21	BB-22	CC-01	CC-02	CC-03	CC-04	CC-05
Start Date	8/6/2019	8/8/2019	8/8/2019	8/10/2019	8/11/2019	8/11/2019	8/7/2019	8/7/2019	8/4/2019	8/4/2019	8/4/2019
Duration (hour)	0.53	0.50	0.51	0.51	0.51	0.35	0.50	0.51	0.51	0.53	0.52
Distance Fished (km)	2.83	2.78	2.77	2.83	2.79	1.91	2.72	2.79	2.77	2.95	2.69
Mid-Latitude (ºN)	64	63.96	63.99	63.99	64.05	64	64.33	64.32	64.34	64.33	64.33
Mid-Longitude (ºW)	-161.53	-169.04	-169.78	-170.56	-171.35	-172.01	-168.32	-167.61	-166.83	-166.05	-165.33
Bottom Depth (m)	19	35	35	29	32	53	40	31	30	23	25
Bottom Temperature (ºC)	14.2	3.1	3.3	4.4	3.8	1.5	3.4	5.5	11.2	12.3	12.7
Red King Crab											
Immature males	0	0	0	0	0	0	0	701	1,750	296	258
Mature males	0	0	0	0	0	0	0	351	80	148	345
Legal	0	0	0	0	0	0	0	175	0	148	258
Immature females	0	0	0	0	0	0	0	0	2,546	74	172
Mature females	0	0	0	0	0	0	0	0	159	296	86
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.13	10.17	6.66	6.93
Blue King Crab											
Immature males	0	0	84	868	81	0	0	0	159	0	0
Mature males	0	0	168	79	0	0	0	0	0	0	0
Legal	0	0	84	79	0	0	0	0	0	0	0
Immature females	0	0	84	237	81	0	0	0	0	0	0
Mature females	0	0	168	868	81	0	88	0	0	0	0
Total weight (kg)	0.00	0.00	4.98	10.30	2.09	0.00	0.43	0.00	0.36	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	48,172	61829	115,534	202499	7222	1148	47,105	3,580	1,699	517
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	50,105	47,477	46,441	89203	2167	1501	49,702	3,421	1,995	689
Mature females	0	0	0	158	4204	619	0	88	0	0	0
Total weight (kg)	0.00	3.01	17.27	39.58	117.40	3.69	0.30	11.66	0.87	0.76	0.23
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	CC-06	CC-07	CC-08	CC-09	CC-10	CC-18	CC-19	CC-20	CC-21	DD-01	DD-02
Start Date	8/5/2019	8/5/2019	8/6/2019	8/6/2019	8/6/2019	8/9/2019	8/8/2019	8/10/2019	8/10/2019	8/6/2019	8/5/2019
Duration (hour)	0.53	0.52	0.52	0.52	0.53	0.50	0.51	0.50	0.51	0.50	0.51
Distance Fished (km)	2.89	2.90	2.79	2.92	2.99	2.76	2.86	2.80	2.82	2.75	2.79
Mid-Latitude (ºN)	64.32	64.34	64.25	64.33	64.32	64.33	64.3	64.33	64.23	64.66	64.67
Mid-Longitude (ºW)	-164.53	-163.78	-163.13	-162.27	-161.56	-169.08	-169.82	-170.59	-171.1	-168.35	-167.61
Bottom Depth (m)	16	19	21	19	15	40	39	37	40	41	30
Bottom Temperature (ºC)	12.7	13.4	13.5	14.0	15.3	2.4	2.6	1.9	2.0	2.1	8.5
Red King Crab											
Immature males	161	0	0	0	0	0	0	0	0	0	494
Mature males	0	0	0	0	0	0	0	0	0	0	82
Legal	0	0	0	0	0	0	0	0	0	0	82
Immature females	0	0	0	0	0	0	0	0	0	0	82
Mature females	81	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.65	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.99
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	86	0	0	82	0	0
Legal	0	0	0	0	0	86	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	82	0	0
Mature females	0	0	0	0	0	0	79	81	163	178	82
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	1.81	0.54	0.65	2.75	1.39	0.78
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	0	0	0	0	39,340	116,747	13,661	50,069	19,588	742
Mature males	0	0	0	0	0	0	0	0	245	0	0
Legal	0	0	0	0	0	0	0	0	82	0	0
Immature females	0	0	0	0	0	25,900	83,689	6,478	25,632	11,808	412
Mature females	0	0	0	0	0	0	0	162	1,308	0	0
Total weight (kg)	0	0	0	0.00	0	6.71	36.81	7.12	29.15	5.23	0.19
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	DD-03	DD-18	DD-19	DD-20	EE-01	EE-02	EE-18	EE-19	FF-01	FF-02	FF-18
Start Date	8/4/2019	8/9/2019	8/9/2019	8/10/2019	8/6/2019	8/5/2019	8/6/2019	8/6/2019	8/5/2019	8/5/2019	8/5/2019
Duration (hour)	0.52	0.28	0.52	0.51	0.52	0.51	0.51	0.51	0.50	0.51	0.50
Distance Fished (km)	2.85	1.53	2.88	2.85	2.90	2.75	2.78	2.70	2.73	2.71	2.75
Mid-Latitude (ºN)	64.66	64.66	64.66	64.63	65	65.01	65.01	65.01	65.34	65.3	65.22
Mid-Longitude (ºW)	-166.82	-169.12	-169.89	-170.61	-168.36	-167.64	-169.11	-169.9	-168.39	-167.67	-168.9
Bottom Depth (m)	25	44	47	48	45	34	49	50	53	38	53
Bottom Temperature (ºC)	11.9	2.2	1.8	2.7	3.7	9.9	2.3	2.8	3.9	9.6	2.1
Red King Crab											
Immature males	0	0	0	0	0	83	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	75	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	84	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.82	0.34	0.00
Blue King Crab											
Immature males	0	137	73	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	77	226	0	0
Legal	0	0	0	0	0	0	0	0	75	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	78	0	0	77	151	0	0
Total weight (kg)	0.00	0.47	0.24	0.00	0.69	0.00	0.00	1.89	6.79	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	90,640	100517	38,141	17,209	248	52,304	110,210	25,138	0	3,301
Mature males	0	0	511	71	0	0	143	542	0	0	0
Legal	0	0	0	0	0	0	0	155	0	0	0
Immature females	0	57,411	48019	26,529	14,169	83	39,890	57,331	20,090	0	1,320
Mature females	0	0	511	282	0	0	499	1162	0	0	83
Total weight (kg)	0	17.45	30.38	18.46	3.53	0.03	26.54	37.1	6.44	0	1.65
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	R-01	R-02	R-03	R-18	R-19	R-20	R-21	S-01	S-02	S-03	S-18
Start Date	8/19/2019	8/18/2019	8/18/2019	8/20/2019	8/20/2019	8/20/2019	8/20/2019	8/19/2019	8/19/2019	8/18/2019	8/19/2019
Duration (hour)	0.53	0.53	0.52	0.52	0.51	0.52	0.53	0.53	0.53	0.54	0.52
Distance Fished (km)	2.92	3.03	2.81	2.93	2.67	2.82	2.83	2.80	2.96	3.01	2.74
Mid-Latitude (ºN)	60.67	60.66	60.67	60.67	60.67	60.67	60.67	61	61	61	61
Mid-Longitude (ºW)	-168.02	-167.33	-166.64	-168.7	-169.37	-170.09	-170.77	-168.04	-167.37	-166.65	-168.71
Bottom Depth (m)	30	25	20	36	42	50	59	30	23	18	36
Bottom Temperature (ºC)	12.0	12.5	13.4	10.6	7.5	4.2	3.1	11.9	12.6	14.0	10.8
Red King Crab											
Immature males	0	0	0	0	80	0	0	0	0	0	0
Mature males	0	0	0	0	80	0	0	0	0	0	0
Legal	0	0	0	0	80	0	0	0	0	0	0
Immature females	0	0	0	0	80	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	2.66	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	0	0	0	0	8,426	294,488	0	0	0	0
Mature males	0	0	0	0	0	7420	10709	0	0	0	0
Legal	0	0	0	0	0	880	5,354	0	0	0	0
Immature females	0	0	0	0	0	215	40,807	0	0	0	0
Mature females	0	0	0	0	0	143	8,188	0	0	0	0
Total weight (kg)	0.00	0	0	0	0	25.3	280.15	0	0	0	0
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	S-19	S-20	S-21	T-01	T-02	T-03	T-18	T-19	T-20	T-21	T-22
Start Date	8/19/2019	8/19/2019	8/19/2019	8/17/2019	8/17/2019	8/18/2019	8/16/2019	8/19/2019	8/18/2019	7/30/2019	7/30/2019
Duration (hour)	0.50	0.52	0.51	0.52	0.51	0.54	0.52	0.51	0.52	0.52	0.51
Distance Fished (km)	2.78	2.86	2.82	2.79	2.82	3.06	2.80	2.78	2.82	2.71	2.73
Mid-Latitude (ºN)	61	60.99	60.99	61.33	61.34	61.33	61.33	61.33	61.34	61.34	61.34
Mid-Longitude (ºW)	-169.42	-170.07	-170.77	-168.09	-167.37	-166.68	-168.77	-169.46	-170.17	-170.85	-171.48
Bottom Depth (m)	41	48	54	29	24	14	35	40	47	49	55
Bottom Temperature (ºC)	6.3	4.1	2.9	11.2	12.5	13.5	10.6	8.7	3.8	1.8	1.8
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	86	0	0	0
Legal	0	0	0	0	0	0	0	86	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	87	520	270,323	0	0	0	0	0	3,422	366574	111,722
Mature males	0	74	7669	0	0	0	0	0	2814	21898	10649
Legal	0	0	0	0	0	0	0	0	304	912	2018
Immature females	0	0	49,605	0	0	0	0	0	0	123,194	19,509
Mature females	0	0	14,940	0	0	0	0	0	0	49280	18500
Total weight (kg)	0.03	0.71	260.24	0.00	0	0	0	0.00	9.08	429.8	142
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	T-23	T-24	U-01	U-02	U-03	U-18	U-19	U-20	U-21	U-22	U-23
Start Date	7/29/2019	7/29/2019	8/16/2019	8/17/2019	8/17/2019	8/16/2019	8/18/2019	8/18/2019	7/30/2019	7/30/2019	7/29/2019
Duration (hour)	0.50	0.52	0.53	0.51	0.52	0.52	0.51	0.52	0.52	0.50	0.52
Distance Fished (km)	2.69	2.77	2.92	2.90	2.73	2.77	2.82	2.87	2.69	2.80	2.72
Mid-Latitude (ºN)	61.34	61.33	61.67	61.67	61.65	61.67	61.67	61.66	61.67	61.68	61.66
Mid-Longitude (ºW)	-172.29	-172.93	-168.08	-167.39	-166.73	-168.8	-169.51	-170.18	-170.92	-171.56	-172.33
Bottom Depth (m)	63	69	29	25	22	36	41	46	50	56	62
Bottom Temperature (ºC)	1.9	1.6	10.6	11.6	12.9	8.6	5.5	2.5	1.1	1.3	1.0
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Snow Crab											
Immature males	28,694	37,613	0	0	0	0	569	106627	318517	195678	133,018
Mature males	6,475	6,423	0	0	0	0	0	6007	12183	31189	23,012
Legal	671	2,770	0	0	0	0	0	751	3496	848	6,415
Immature females	11,186	11,145	72	0	0	75	325	35902	68476	23092	37,639
Mature females	39,680	82,680	0	0	0	0	0	875	16074	5248	24,002
Total weight (kg)	81.76	118.80	0.02	0	0	0.01	0.16	98.58	268.21	249.11	204.07
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	U-24	V-01	V-02	V-03	V-18	V-19	V-20	V-21	V-22	V-23	V-24
Start Date	7/29/2019	8/16/2019	8/10/2019	8/9/2019	8/15/2019	8/18/2019	8/18/2019	7/30/2019	7/30/2019	7/29/2019	7/29/2019
Duration (hour)	0.52	0.53	0.53	0.52	0.51	0.52	0.52	0.50	0.50	0.49	0.53
Distance Fished (km)	2.73	2.88	2.80	2.86	2.77	2.93	2.84	2.74	2.72	2.72	2.78
Mid-Latitude (ºN)	61.68	62	61.99	62	62	61.99	62	62	61.99	62.01	62.01
Mid-Longitude (ºW)	-173.09	-168.13	-167.42	-166.7	-168.84	-169.56	-170.24	-170.98	-171.66	-172.37	-173.08
Bottom Depth (m)	66	29	26	22	36	42	47	50	53	56	58
Bottom Temperature (ºC)	1.4	9.9	10.4	11.9	4.8	2.4	1.6	0.7	0.8	0.6	0.8
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0	0.00	0	0.00	0.00	0	0.00	0	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	364,832	836	0	0	220	73,227	51120	139699	55849	219486	403,739
Mature males	77811	0	0	0	0	0	0	1876	8195	33055	37411
Legal	25,692	0	0	0	0	0	0	216	1151	6611	5296
Immature females	91,702	1,444	80	0	146	36248	29077	41570	6083	40997	117,630
Mature females	57,988	0	0	0	0	71	2691	1,732	869	2458	11,825
Total weight (kg)	599.76	0.52	0.01	0	0.04	19.73	46.10	108.24	68.95	267.78	486.43
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	W-01	W-02	W-03	W-18	W-19	W-20	W-21	W-22	W-23	W-24	W-25
Start Date	8/15/2019	8/10/2019	8/9/2019	8/15/2019	8/17/2019	8/17/2019	7/30/2019	7/30/2019	7/29/2019	7/29/2019	7/29/2019
Duration (hour)	0.53	0.53	0.51	0.52	0.51	0.50	0.51	0.50	0.50	0.51	0.50
Distance Fished (km)	2.88	2.75	2.74	2.89	2.80	2.78	2.76	2.76	2.71	2.77	2.77
Mid-Latitude (ºN)	62.34	62.34	62.34	62.34	62.35	62.33	62.34	62.32	62.33	62.33	62.33
Mid-Longitude (ºW)	-168.14	-167.44	-166.74	-168.87	-169.59	-170.28	-171.05	-171.71	-172.45	-173.16	-173.86
Bottom Depth (m)	31	27	23	34	36	41	43	47	55	59	64
Bottom Temperature (ºC)	7.5	8.7	11.6	3.2	2.7	2.6	0.7	0.7	0.5	0.6	0.3
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0	0	0	0	0	0.00	0
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	0	0	0	0	77	158	3,977	1,863	2648	35621	259746
Mature males	0	0	0	0	0	0	145	75	147	10113	46433
Legal	0	0	0	0	0	0	0	0	0	3667	13414
Immature females	0	0	0	0	230	79	1,735	894	809	16157	43412
Mature females	0	0	0	0	0	0	72	0	294	6458	4485
Total weight (kg)	0.00	0.00	0	0	0.09	0.04	3.08	1.19	2.54	63.48	368.12
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	W-26	W-27	X-01	X-02	X-03	X-18	X-19	X-20	X-21	X-22	X-23
Start Date	7/29/2019	7/28/2019	8/15/2019	8/10/2019	8/9/2019	8/14/2019	8/17/2019	8/17/2019	8/16/2019	8/15/2019	8/15/2019
Duration (hour)	0.50	0.50	0.52	0.52	0.53	0.51	0.50	0.50	0.52	0.51	0.50
Distance Fished (km)	2.71	2.74	2.89	2.86	2.93	2.75	2.75	2.72	2.87	2.76	2.73
Mid-Latitude (ºN)	62.34	62.32	62.67	62.67	62.66	62.67	62.67	62.67	62.68	62.66	62.67
Mid-Longitude (ºW)	-174.57	-175.32	-168.19	-167.45	-166.75	-168.89	-169.65	-170.33	-171.1	-171.82	-172.51
Bottom Depth (m)	71	80	34	29	26	38	38	40	45	50	55
Bottom Temperature (ºC)	-0.5	0.2	5.7	7.9	9.8	2.3	1.1	0.2	0.5	0.8	0.8
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	89100	5088	432	0	0	228	1,852	58,284	1,439	12,804	1560
Mature males	76169	52097	0	0	0	0	0	0	0	0	0
Legal	41139	38602	0	0	0	0	0	0	0	0	0
Immature females	32932	602	216	0	0	76	2,093	63,942	144	6,448	223
Mature females	10272	9835	0	0	0	0	0	408	144	0	149
Total weight (kg)	310.08	199.36	0.08	0	0.00	0.07	0.74	34.19	0.59	4.52	0.91
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	X-24	X-25	X-26	Y-01	Y-02	Y-03	Y-04	Y-18	Y-20	Y-21	Y-22
Start Date	8/15/2019	8/15/2019	8/14/2019	8/13/2019	8/10/2019	8/9/2019	8/8/2019	8/14/2019	8/16/2019	8/16/2019	8/15/2019
Duration (hour)	0.51	0.50	0.52	0.51	0.52	0.52	0.52	0.51	0.51	0.52	0.50
Distance Fished (km)	2.76	2.68	2.89	2.78	2.83	2.80	2.97	2.76	2.78	2.83	2.76
Mid-Latitude (ºN)	62.67	62.66	62.67	63.01	63	63.01	63	62.87	62.95	63	62.97
Mid-Longitude (ºW)	-173.19	-173.91	-174.63	-168.21	-167.49	-166.76	-166.02	-168.83	-170.49	-171.13	-171.81
Bottom Depth (m)	65	69	74	40	34	29	21	39	40	48	53
Bottom Temperature (ºC)	0.1	-0.5	-0.1	4.4	3.9	9.1	10.8	2.1	-0.2	-0.5	-0.6
Red King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	77	0	0	0	0	0	0
Legal	0	0	0	0	77	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	2.73	0.00	0.00	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	44,207	14089	26,534	2175	1082	78	0	3,524	162	0	1,389
Mature males	135	3192	2375	0	0	0	0	0	0	0	0
Legal	135	1245	1412	0	0	0	0	0	0	0	0
Immature females	43,588	591	21735	3118	309	78	0	3,899	324	0	1,242
Mature females	2693	1774	4226	0	0	0	0	0	0	0	0
Total weight (kg)	43.88	24.41	41.19	0.12	0.18	0.01	0	1.08	0.15	0	0.5
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	Y-23	Y-24	Y-25	ZZ-01	ZZ-02	ZZ-03	ZZ-04	ZZ-05	ZZ-21	ZZ-22	ZZ-23
Start Date	8/14/2019	8/14/2019	8/14/2019	8/13/2019	8/10/2019	8/8/2019	8/8/2019	8/8/2019	8/16/2019	8/13/2019	8/13/2019
Duration (hour)	0.51	0.51	0.52	0.53	0.43	0.52	0.53	0.53	0.26	0.48	0.52
Distance Fished (km)	2.79	2.80	2.84	2.91	2.37	2.74	2.92	2.96	1.41	2.62	2.84
Mid-Latitude (ºN)	63.02	63.01	63	63.34	63.34	63.34	63.33	63.33	63.27	63.3	63.33
Mid-Longitude (ºW)	-172.6	-173.29	-174.01	-168.28	-167.51	-166.77	-166.04	-165.31	-171.12	-171.98	-172.65
Bottom Depth (m)	62	70	74	33	33	27	24	15	31	59	63
Bottom Temperature (ºC)	-0.5	-0.6	-0.2	2.3	3.6	6.9	10.4	13.3	1.3	0.6	0.4
Red King Crab											
Immature males	0	0	0	0	0	0	228	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	228	0	0	0	0
Mature females	0	0	0	0	0	0	76	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	1.76	0.00	0.00	0.00	0.00
Blue King Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	74	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0	0.00	0	0	0	0	0.00	0	1.18	0
Tanner Crab											
Immature males	0	0	0	0	0	0	0	0	0	0	0
Mature males	0	0	0	0	0	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snow Crab											
Immature males	962	65,555	25,451	7,958	10,446	0	76	0	144	0	68
Mature males	0	69	285	0	0	0	0	0	0	0	0
Legal	0	0	171	0	0	0	0	0	0	0	0
Immature females	412	35,918	26,130	4,677	11,597	0	0	0	0	0	68
Mature females	0	7518	16080	70	0	0	0	0	0	0	68
Total weight (kg)	0.47	57.79	41.77	3.38	3.14	0	0	0	0.01	0	0.08
Chionoecetes spp. Hybrid											
Males ≤ 77 mm	0	0	0	0	0	0	0	0	0	0	0
Males ≥ 78 mm	0	0	0	0	0	0	0	0	0	0	0
Immature females	0	0	0	0	0	0	0	0	0	0	0
Mature females	0	0	0	0	0	0	0	0	0	0	0
Total weight (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B. -- Tow details, crab density (number nmi^{-2}), and catch weight at 2019 northern Bering Sea bottom trawl survey stations.

Station	ZZ-24
Start Date	8/13/2019
Duration (hour)	0.51
Distance Fished (km)	2.80
Mid-Latitude (ºN)	63.34
Mid-Longitude (ºW)	-173.41
Bottom Depth (m)	71
Bottom Temperature (ºC)	0.0
Red King Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Blue King Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Tanner Crab	
Immature males	0
Mature males	0
Legal	0
Immature females	0
Mature females	0
Total weight (kg)	0.00
Snow Crab	
Immature males	91,098
Mature males	0
Legal	0
Immature females	19,874
Mature females	19,010
Total weight (kg)	65.69
Chionoecetes spp. Hybrid	
Males ≤ 77 mm	0
Males ≥ 78 mm	0
Immature females	0
Mature females	0
Total weight (kg)	0.00

U.S. Secretary of Commerce
Wilbur L. Ross, Jr.

Acting Under Secretary of Commerce for Oceans and Atmosphere
Dr. Neil Jacobs

Assistant Administrator for Fisheries
Chris Oliver

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www.nmfs.noaa.gov

OFFICIAL BUSINESS

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